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Vaccination of Guinea Pigs with Vole Bacillus.—The vole acid-fast bacillus is believed to be an undescribed type of tubercle bacillus. (No description of the vole bacillus or its cultural reactions is given in this paper. The disease in wild voles (field-mice), which closely resembles tuberculosis, has already been briefly described by one of the authors in the Lancet for May 22, 1937, 232: 1221). It is known that this bacillus is only slightly virulent for guinea pigs. A subcutaneous injection of 5 mg. or more may produce progressive disease and death; a smaller inoculum produces a local abscess with caseation and sometimes ulceration, but the lesion is regressive. The inoculum employed was a suspension made from cultures on Dorset's egg medium. *Present Study:* Experiment 1: Three guinea pigs were inoculated in the left groin with caseous material from naturally infected voles. A local lesion with ulceration developed but there was no sign of generalized disease. Nine months later 0.000,001 mg. of low virulence bovine bacilli was injected into the right groin of each of these 3 animals and 3 normal animals. Six months later all animals were killed, one of the controls having died in the meantime of intercurrent infection. In only one of the "vaccinated" animals was there any macroscopical tuberculosis (2 small tubercles in the lungs) apart from the small caseous lesion at the site of the injection. The two controls showed extensive generalized tuberculosis. Experiment 2: Three groups of 5 guinea pigs were used. Group 1 received 1 mg. of a two-month culture of vole acid-fast bacillus in the left groin and group 2 received 0.1 mg. Group 3 served as a control. Three months later all animals received 0.000,01 mg. of a one-month culture of recently isolated human tubercle bacilli in the right groin. When killed, three months after this, the guinea pigs in group 1 showed no macroscopical evidences of disease in the lymph nodes or organs. All showed small local abscesses. (It is not clear from the text whether these local abscesses were in the right or left groin). Two of the group 2 animals showed beginning generalized tuberculosis. All of the group 3 animals died before three months with extensive disease. It is apparent that the injection of 1 mg. of vole acid-fast bacilli gave a greater degree of protection than 0.1 mg. The final experiment represented an attempt to compare the degree of protection afforded by the preliminary injection of guinea pigs with two strains of vole acid-fast bacillus and with BCG against infection with human and bovine bacilli. At the beginning, 82 guinea pigs were employed in this experiment, but at the time of reinoculation only 27 animals had survived intercurrent disease. These consisted of 9 animals (group 1) each of which had received 4 weekly subcutaneous in-

jections, totalling 2 mg. of vole bacilli—strain D 15—, in the right and left groin alternately; 10 animals (group 2) which had received exactly similar injections of another strain of vole bacilli —strain LV 565; and 8 animals (group 3) each of which had received 4 weekly doses of a one-month culture of BCG totalling 30 mg. Five months after the completion of vaccination the group 1 animals received 0.000,001 mg. of recently isolated human tubercle bacilli, the group 2 animals the same dose of recently isolated bovine tubercle bacilli, and one-half of the group 3 animals received human and the balance bovine tubercle bacilli as above. An additional group (4) was added at this time to serve as a control. This consisted of 16 normal animals, 8 of which received human and 8 bovine bacilli. The reinfection dose in all instances was given in the axilla. All the animals, with the exception of 2 each in groups 1 and 2, were killed after eleven weeks. It was originally intended to leave all the animals for eighteen months or until death, but the advent of war interrupted the experiment. The degree of infection found in the various groups showed marked variation. Eleven of the animals in groups 1 and 2 (vole acid-fast vaccinated) showed either no macroscopic lesion or a small local abscess and the remaining 4 showed very early signs of generalized tuberculosis. In the BCG group all showed generalized disease, but less extensive than in the controls who all showed extensive generalized tuberculosis. Four weeks after reinfection the axillary nodes could be palpated in 15 out of 16 of the controls but in only 2 out of the 15 animals vaccinated with vole acid-fast bacilli and in 5 out of 8 animals vaccinated with BCG. Ten weeks after reinfection all the controls and BCG vaccinated animals had enlarged nodes, but in only 10 out 15 vole vaccinated animals were the nodes palpable. Caseous matter at the site of vaccination was present at death in about two-thirds of the vaccinated animals. The presence or absence of this caseous matter did not seem to be related to the degree of immunity. All animals were tuberculin tested at the time of reinfection and from time to time subsequently. All the vole vaccinated animals reacted to the 1:20 tuberculin dilution at the time of reinfection, but only 2 to the 1:100 dilution. The BCG treated animals gave the same proportion. Later on more and more of the animals reacted to the higher dilutions, but at eleven weeks none of the vole vaccinated animals reacted to the 1:1,000 dilution of tuberculin, whereas 3 of the BCG group and 15 of the control group reacted. Thus, a high degree of tuberculin sensitivity took longer to develop in the vaccinated animals than in the controls, and in the vole vaccinated animals a degree higher than to the 1:100 dilution never developed. Two of the 4 guinea pigs in groups 1 and 2 which were not killed at eleven weeks, died sixteen weeks after reinfection. One was in group 1 and the other in group 2. The only macroscopic sign of tuberculosis found was a small caseous lesion at the site of inoculation in the left axilla of each animal. The remaining 2 animals were alive twenty weeks after reinfection. The degree of protection which vaccination with the vole acid-fast bacilli afforded these animals is far greater than has been recorded by other means.—*The Effect of Vaccination of Guinea-Pigs with the Vole Acid-fast Bacillus on Subsequent Tuberculous Infection, A. Q. Wells & W. S. Brooke, Brit. J. Exper. Path., April, 1940, 21: 104.*—(*J. S. W.*)

Sensitizing Guinea Pigs to BCG.—Recent studies have been of interest in using the scarification method as a route of introduction of BCG into the animal body. It appears to be of further interest to study the action of various vehicles not only as a mechanism of penetration of the vaccine but also in the hope of ameliorating the conditions of employing this method in clinical work. It has previously been shown that the modalities of allergy provoked by subcutaneous injection of BCG vary if its vehicle is physiological saline or olive oil. With the latter animals react earlier and to smaller doses of tuberculin. The paraffins have been shown to be more favorable vehicles of BCG for sensitizing guinea pigs by the parenteral route when killed bacilli are employed. Series of studies were made giving guinea pigs by the scarification method about 5 mg. of BCG in the following vehicles: Sauton's medium, physiological salt solution, aqueous solution of gum arabic, olive oil, vaseline oil and pure glycerine. For comparison, other groups of guinea pigs were inoculated with dead bacilli in physio-

logical saline, vaseline oil and glycerine. In the former experiments the guinea pigs receiving BCG suspended in physiological salt solution and in Sauton's medium manifested the most marked allergic reactions. The majority of the animals reacted to a dilution of tuberculin of 1:200 from the seventh day following the inoculation. At the end of a month they reacted to a tuberculin dilution of 1:200,000. Sensitivity to tuberculin was produced much more slowly and in lower titres in the animals infected with BCG suspended in olive oil. Glycerine suspensions of BCG produced the poorest sensitivity to tuberculin. Larger doses (50 mg.) of killed tubercle bacilli administered in a similar manner were used as inoculants in the control group. The group of animals receiving the aqueous suspensions showed the greater sensitivity, but lower in degree than in the group receiving living BCG. It was concluded that by the scarification method with living BCG as well as with killed bacilli, the penetration of the microbic bodies was better when an aqueous vehicle than when an oily one was used, pure glycerine being the poorest. These experiments reconfirmed the great superiority of living bacilli over killed bacilli for the production of sensitivity. The sensitivity thus obtained was of the same order as that obtained in tuberculous guinea pigs. It appeared earlier, was more constant and especially more intense than the sensitivity conferred by killed bacilli.—*Remarques sur le rôle joué par différents excipients pour sensibiliser le cobaye au BCG par la méthode des scarfications, J. Bretey, Compt. rend. Soc. de biol., 1940, 133: 644.*—(*M. T. W.*)

Antigenic Depot Excised.—Heat-killed tubercle bacilli suspended in paraffin oil were injected into the skin of the abdomen of rabbits to stimulate the formation of complement-fixing antibodies. To determine the rôle of the antigenic depot or site of injection this area including the skin and subcutaneous tissue was excised in one group of animals, at intervals varying from one minute to fourteen days after injection. Complement fixation tests were performed on the sera of all injected rabbits at weekly intervals. It was found that antibodies were not formed when the antigenic depot had been excised within one hour after injection. However, when excision had occurred six hours or more after injection complement-fixing antibody was present in the serum and it was found earlier in the serum of rabbits with the areas of injection excised than in the serum of those with the antigenic depot intact. The ultimate serum titre was lower in the rabbits in which excision had occurred before the thirtieth hour and higher in those in which the lesion had been removed later or not at all.—*Antibody Formation in a Lesion Produced by Tubercle Bacilli Suspended in Paraffin Oil: Excision of the Antigenic Depot, J. O. Westwater, J. Immunol., April, 1940, 38: 267.*—(*A. H. C.*)

BCG Vaccination.—Experimental research on 50 guinea pigs shows that, after virulent infection, previously vaccinated animals live more than four times longer than controls, and when killed some time after infection, they present much smaller tuberculous lesions than controls. These results demonstrate clearly the restraining influence of BCG vaccination on experimental tuberculosis. A comparison was made between two groups of children living in tuberculous surroundings. The first group (449 children) was vaccinated with BCG and the second group (122 children) was not vaccinated. The vaccinated group shows a five-fold diminution of tuberculous morbidity and ten-fold diminution of tuberculous mortality in comparison with the unvaccinated group.—*Anti-tuberculous Immunity Produced by B.C.G.-vaccine, J. Zeyland & J. Pisaecka-Zeyland, Acta paediat., 1940, Fasc. III, 27: 393.*—(*R. K.*)

Receptor Analysis of Acid-fast Bacteria.—By means of agglutination, agglutination absorption and cross agglutination experiments the author investigated the antigenic structure of tubercle bacilli and acid-fast saprophytes. The antigenicity of acid-fast bacteria was not affected by heating for two hours at 100°C. While mice may be immunized with living acid-fast bacteria, the potency of the resulting antiserum is irregular. Microscopical agglutination with undiluted or slightly diluted sera was of value in differentiating some of the acid-fast bacteria and especially the S and R forms of avian tubercle bacilli. Agglutinins prepared against the S colonies of avian tubercle bacilli

were absorbed by the homologous variant, while the R variant absorbed some of the S antibodies. On the other hand, the agglutinins prepared by immunizing with the R variant of the tubercle bacillus were absorbed by both the R and the S antigen. The author found that the S variant of mammalian tubercle bacilli could be obtained on Petragnani's medium while the R variant was obtained on Petroff's medium. Human type strains of tubercle bacilli were not readily dissociated and intermediate types of colonies were frequently observed. It was not possible to differentiate, by means of agglutination experiments, between the R and S variants of human and bovine type tubercle bacilli, nor was it found possible to differentiate serologically the human and bovine tubercle bacillus. By means of absorption experiments it was found that acid-fast saprophytes were antigenically distinct from tubercle bacilli. Thus antibodies prepared from the frog bacillus were removed completely by the addition of either the homologous culture or a culture of related acid-fast bacteria found in water. These antibodies were not removed, however, by the addition of human type tubercle bacilli. Timothy and smegma bacilli differed antigenically from the acid-fast bacteria found in water. The author concludes that the agglutination and agglutination-absorption procedures are of value in differentiating the antigenic structure of acid-fast bacteria and that the R antigen of the avian tubercle bacillus is specific in character.— *Versuche einer Differenzierung der säurefesten Bakterien mittels des Agglutinationsverfahrens, T. Ebina, Zentralbl. f. Bakt., April 2, 1940, 145: 289.*—(*J. D. A.*)

Protective Function of Saliva.—Saliva has the faculty of inhibiting the growth of diphtheria bacilli and of transforming them into pseudo-diphtheria bacilli. It has similar effects on other bacilli. Experiments are reported which were done to show the effect of saliva on tubercle bacilli. The growth of tubercle bacilli on culture media was delayed or even completely inhibited if the tubercle bacilli emulsion had been mixed with saliva. It was found that the tubercle bacilli were killed by the saliva in some cases. The inhibiting substances react to heat differently in different persons and differently at different times in the same person. Contrary to the opinion of other authors, the thiocyanides do not seem to be the inhibiting substances.—*Über Tuberkelbazillen—feindliche Stoffe im Speichel, H. Dold & F. Ochsenreither, Ztschr. f. Tuberk., January, 1941, 85: 326.* —(*G. C. L.*)

Tuberculin Patch Test.—From this study of 330 children one may conclude that the tuberculin patch test is a simple, practical, and reliable test, somewhat more sensitive than the Mantoux test (0.1 mg. of Old Tuberculin). For routine work it may be recommended as the initial test in place of the Pirquet, and if the result is negative at the end of one week, a Mantoux intracutaneous test with 0.1 mg. of Old Tuberculin should be performed.—*Evaluation of the Tuberculin Patch Test, A. H. Fineman & G. Bair, Am. J. Dis. Child., September, 1940, 60: 631. (From Authors' Conclusions).* —(*M. B.*)

Diagnosis of Lung Diseases.—Twenty-five years ago there were many good clinicians who sincerely believed that a careful physical examination by a competent chest physician would afford an accurate diagnosis in most cases of early tuberculosis for the reason that they believed that physical signs were far more important than X-ray findings. As knowledge advanced and accurate interpretations of chest pathology as revealed in the roentgenogram became more widely known, well trained clinicians quickly recognized the important place which an X-ray examination of the chest occupied. Conversely, the good radiologist realizes that X-ray examinations should supplement, not replace, physical examinations and clinical histories. There are, unfortunately, some clinicians and radiologists who do not appreciate the proper place of X-ray examinations in the determination and evaluation of chest pathology. It has become necessary in an ever increasing number of cases to correlate roentgen and clinical findings in which a diagnosis is possible only after repeated roentgen examinations at fairly frequent intervals and careful clinical checks. In conclusion, the radiologist's place in the diagnosis of lung pathology is that of an all important consultant whose findings must

be correlated with those of the other medical men. He should state his findings and opinions boldly, should frankly state his inability to understand changes seen in any given case and should seek aid when a group of changes are encountered with which he is not familiar.—*The Radiologist's Place in the Diagnosis of Lung Pathology, F. B. Bogart, Radiology, June, 1940, 34: 750.*—(*G. F. M.*)

Miniature Films.—The author discusses the practicability and value of the use of miniature X-ray films, size 4 x 5 inches, in making total surveys of sections of the population, in which cases the cost of the large film is prohibitive. The photoroentgenographic unit is easily installed in a mobile unit and located within working distances of the districts under survey. A statistical study is presented of the highest mortality area in Chicago, with a large Negro population, with a series of 10,000 patients filmed. Of these, an analysis is presented of 8942 Negroes, 340 white patients and 66 others, a total of 9,348. A special cone shaped view box with a magnifying lens was constructed to study the series, a dissenting opinion from any one of the four roentgenologists resulting in the ordering of a 14 x 17 in. film. In the series, 351 cases of reinfection type tuberculosis were found, or 3.75 per cent of the series. This high percentage represents an area of 301.6 mortality from tuberculosis. An unexpected finding was the fact that in the 340 white persons there was an incidence of 5.29 per cent as compared with a 3.71 per cent incidence in the Negro group. The number of white persons in the series was too small, however, to justify any conclusions. In the whole series, in the age groups between fifteen and twenty-nine, the incidence for males was 3.9 per cent against 4.9 per cent for the females, representing an excess incidence for females of 26 per cent. Of the 351 cases showing roentgenological evidence of tuberculosis on the original film (45 were later added after subsequent films, making the total incidence 4.24 per cent), 167, or 47.6 per cent, were minimal, 141, or 40.2 per cent, were moderately advanced and 43, or 12.2 per cent, were far advanced. The figures relative to minimal tuberculosis are of considerable importance. In view of the fact that, of 863 Negroes diagnosed tuberculous in clinics during 1939, 12 per cent were minimal and 88 per cent advanced, the ratio of minimal cases found in the survey, 48 per cent, must be considered as extremely gratifying. In the series 37 per cent of cases diagnosed reinfection type showed visible primary, as against 14.8 per cent for all films read. The significance of this finding is a matter of speculative interest and further research along this line is indicated. Total survey, including all members of the family, was justified by the unusually high rate that was found in children. It is the opinion of the author that the miniature film represents a new and efficient public health instrument destined probably to general acceptance by all communities with a serious tuberculosis problem. He is convinced that future developments will lie in the direction of a still smaller and a still cheaper film, possibly the 35 mm. film as used by De Abreu of Rio de Janeiro.—*The Miniature X-ray Film in the "Total Survey," F. Tice, J. A. M. A., October 12, 1940, 115: 1254.*—(*G. L. L.*)

Miniature X-ray Films.—Apparatus for this examination consists essentially of a light-proof box of pyramidal shape with a fluoroscopic screen (either fluorazure Patterson or "B" Patterson) on one end, a 35 mm. film camera with an F 1.5 lens at the other, and means for adjusting the height of the apparatus. Film recommended for use with the "B" screen is high speed panchromatic; for the fluorazure screen special film similar in its characteristics to ordinary roentgen film is used. The exposure factor is about twelve times that necessary with the standard double-coated roentgen film and high speed intensifying screens. The film may be viewed directly through a magnifying lens or by projecting the image on a screen. The recommended size of the projected image is about one-half the original screen image. This method of examination is considered superior to fluoroscopy because of better visibility of detail and because it represents a permanent record. A 14″ x 17″ film costs about 50 cents, whereas the film in this method measures 2 sq. in. and costs about one cent. This low cost makes possible roentgen-ray surveys of whole populations with the view of determining the presence of pathological conditions, particularly

tuberculosis. It is not intended as a method of fine differentiation as to the type of lesion, but early apical infiltrations, cavities and fibrotic and calcific changes are demonstrable. The image of the pulmonic fields has neither the contrast nor the detail of the large film, but, nevertheless, the record is sufficiently clear to permit differentiation of the normal from the abnormal lung.—*Fluorography, I. S. Hirsch, Am. J. Roentgenol., January, 1940, 43: 45.*—(*W. H. M.*)

X-ray Study of Apical Tuberculosis.—A method is proposed which has advantages over tomography. Various procedures for visualizing the first intercostal space are reviewed. The authors describe a method of radiography in ascending anteroposterior projection that minimizes the interfering bony shadows and permits view of the costoclavicular spaces.—*Exploración de la región apical y bi-costo-clavicular en proyección antero-posterior ascendente, B. Enquin & C. Bett, An. Catedra de pat. y clin. de tuberc., June, 1940, 2: 207.*—(*E. R. L.*)

Diagnosis of Tuberculosis.—The examination by X-ray is the most important means at our disposal to diagnose pulmonary tuberculosis. The author presents the results of various studies on varying numbers of patients in Trudeau Sanatorium, to compare the relative values of physical signs and X-ray observations. In one series of 1367 patients, while 68.5 per cent had râles at an apex more than 99 per cent had definite X-ray demonstrable changes. In another series of 503 patients whose lungs gave only indefinite or no physical signs, X-ray examination showed pulmonary tuberculosis, and sooner or later more than 84 per cent had definite clinical signs of disease. In another series of 280 patients with minimal lung tuberculosis, 277 had definite X-ray evidence, and only 76 definite evidence by physical signs. A thorough physical chest examination should never be omitted, however. In the presence of cavity formation, probably only 5 to 15 per cent of all cavities revealed by X-ray also present physical signs of cavity. The earliest X-ray demonstrable changes in pulmonory tuberculosis may escape observation on account of their location or of their slight density. An absence of change is unusual, for in less than 1 per cent are parenchymatous changes lacking when tubercle bacilli occur in the sputum. The 5 cardinal diagnostic data of tuberculosis in 1,367 cases diagnosed pulmonary tuberculosis from 1,478 consecutive cases in Trudeau Sanatorium were tubercle bacilli 61.5 per cent, râles 68.5 per cent, X-ray examination 99 per cent, hemoptysis 33.5 per cent and pleurisy 12 per cent. Laboratory examination is next in diagnostic importance to X-ray and physical examination. Various laboratory tests have proved unsatisfactory in the determination of activity in pulmonary tuberculosis. Pulmonary changes produced by advance or retrogression, and by final healing of pulmonary tuberculosis, produce certain shadows on the X-ray film which may be differentiated, and interpreted by keen and experienced observers. The problem of an increase in the physical signs with a definite improvement in the clinical condition may be easily solved by the X-ray film. The stereoscopic film is a reasonably reliable method to determine the activity of pulmonary tuberculosis. In a study of 373 cases at Trudeau the clinical activity was compared with the X-ray interpretation of activity. When the disease was "clinically inactive," 37 per cent showed no change, 17 per cent showed an increase. When inactive by X-ray interpretation, the percentages were 48 and 6; when "clinically active", percentages were 15 and 53; and when "active" by X-ray examination, 3 per cent showed no change and 62 per cent grew worse. The X-ray film is the most essential factor in the examination of the child's chest. Most pediatricians base the diagnosis of pulmonary tuberculosis almost entirely on the evidence of the film and the result of the tuberculin skin test. From the standpoint of differential diagnosis the author stresses the importance of becoming acquainted with the normal chest X-ray markings in order to understand the reasons for abnormal shadows.—*The Diagnosis of Tuberculosis: Especially of Pulmonary Tuberculosis, H. M. Kinghorn, J. A. M. A., November 9, 1940, 115: 1614.*—(*G. L. L.*)

Bronchography.—Since the usual methods of bronchography—the introduction of the lipiodol through a tracheal cannula or through the cricothyroid membrane—often are unsatisfactory, the transnasal route is recommended. As anaesthetic the following solution is applied: Cocaine hydrochloride 1.0 g., potassium sulfate .30 g., phenol .10 g., adrenalin 1/1000 5.0 g., aqua laurocerasi 20.0 g., aqua destillata 95.0 g. Fifteen cc. of this mixture are instilled through a speculum which is connected with a 2 cm. long rubber tube. The lipiodol should be warmed to body temperature. The roentgenograms are to be taken quickly before the patient expectorates. The method is simple and safe. It gives very good results and it can be performed without the help of the laryngologist or the surgeon, even in children. Fourteen case records are given and the bronchograms are presented to illustrate the method.—*La lipiodo-bronchographie, J. Gosselin, Laval méd., January, 1941, 6: 6.*—(*G. C. L.*)

Fluoroscopic Roentgenography.—Fluoroscopic roentgenography makes it possible to get X-ray pictures of the thorax in a large number. A technician can take the picture and the physician can read it at an other time and place. The costs are the same as those of a passport photography. The pictures are examined by means of a magnifying apparatus. The pictures are kept singly by mounting on index cards. Fluoroscopic roentgenography often makes a large X-ray picture unnecessary. With the help of this method a few well trained physicians can direct less experienced physicians in a large number of community clinics. There it is possible to check in a short time groups of the population, such as teachers, who may be especially dangerous if they are tuberculous. It is expected that fluoroscopic roentgenography will be valuable for the tuberculosis prevention as well as for the research.—*Eine neuartige Anwendung der Schirmbildphotographie und Möglichkeiten ihrer Auswirkung, H. Grass, Ztschr. f. Tuberk., September, 1940, 85: 94.*—(*G. C. L.*)

Tomography.—In an effort to correlate the roentgenographic findings on tomographic films with the actual pulmonary disease, layer roentgenograms of cadavers were made as soon as possible after death. These films were made by the Twining method at 2-inch, 3-inch and 4-inch levels in both anteroposterior and posteroanterior directions. The autopsies were performed immediately after the roentgenograms had been made and the lungs removed with the parietal pleura and fixed in Keyserling's solution. After fixation the lungs were then sectioned coronally at levels to approximate those at which the roentgenograms had been made. Ten cases of chronic pulmonary tuberculosis were studied by this method. Absolute correlation of roentgenograms with the necropsy findings was present in only 3 of the 10 cases. The reasons for this discrepancy are: (*1*) areas of aerated pulmonary tissue surrounded by pneumonic areas may simulate cavities on layer films; (*2*) in a lung compressed by thoracoplasty bizarre shadows may be caused by the overlying ribs and dense scar tissue; (*3*) the shadow cast by a cavity filled with blood or inspissated caseous material may be indistinguishable from that of the surrounding pulmonary tissue; (*4*) pulmonary fibrosis and thickened pleura may produce in layer films shadows which are very misleading.—*The Correlation between Tomographic Studies of the Lung and the Necropsy Findings, I. G. Epstein, M. Herman, H. Green & W. Cohen, Quart. Bull. Sea View Hosp., July, 1940, 5: 353.*—(*A. A. E.*)

Overexpansion of Lung in Infancy.—Roentgenograms of adults and older children are customarily obtained when fullest comfortable inspiration is attained, but in infants and small children less expansion and aeration are seen for several reasons. Most infants' chests are probably examined in the supine position for the sake of convenience, requiring no special fixation device. In this position the large liver and ever present intestinal gas combine to elevate the diaphragm and the least movement is apt to affect he position of the thorax, distorting the lung fields and the important cardio-mediastinal silhouette. When the technician succeeds in obtaining an ideal position of the patient, he may be tempted to utilize the more obvious expiratory pause, in which case the film will be

secured below tidal air. Thus factors so combine that the average film of an infant tends to resemble that of an older person taken in expiration, but frequently we see films which have all the sharpness of detail to which we are accustomed in the adult and the configuration approaches that of the adult. This may be normal as the film may have been taken at full inspiration. Also films obtained at full inspiration with the infant in an upright position depict a degree of aeration which would indicate real overexposure if obtained in the supine position in quiet breathing. There seems to be a distinct value in only using routine films taken in the supine position at quiet inspiration for they give a ready comparison with cases of overexpansion and may be useful in recognizing those in which persistent over-aeration is present. Allen and Waltz have given a useful index of the "inspiratory state" which is quite reliable; the younger the individual the lower in the index. Several mechanisms may produce over expansion: partial expiratory obstruction from foreign body, bronchial stenosis or viscid bronchial secretions; deficient pulmonary ventilation with compensatory over-breathing as seen in congenital heart disease or pulmonary oedema; and compensatory emphysema due to pulmonary disease. The most common cause of infantile pulmonary hyperexpansion is acute respiratory infections. In the earlier stages pneumonia may be obscured on the background of an over-aerated lung. Evidence of aeration may be obtained incident to severe nonrespiratory disease such as intestinal volvulus. Pulmonary tuberculosis in infants and early childhood shows no special tendency to overexpansion and when pneumonia or parenchymal tuberculosis are to be differentiated, the presence of emphysema and the absence of visible enlargement of the tracheobronchial nodes are points against the latter. However, large tuberculous nodes frequently produce enough bronchostenosis to cause local or general emphysema. The authors conclude by stating that pulmonary overexpansion in infants and small children is an entirely non-specific condition caused by various mechanisms. It may be simulated by a chance very full inspiration. If due to actual disease, it may be a temporary over-aeration in which no recognizable injury is done to the alveoli. As infancy advances into childhood, it is less frequently seen, partly because the films are taken in fuller inspiration, partly because a temporary abnormally heightened aeration less frequently occurs. In any given case, it is to be judged in relation to clinical and roentgen manifestations.—*Pulmonary Overexpansion in Infancy and Early Childhood, R. A. Carter, Radiology, October, 1940, 35: 391.—(G. F. M.)*

Bronchopleural Fistula.—The diagnosis of a bronchopleural fistula in tuberculous empyema may be made by one or all of the following procedures: (*1*) By manometric determinations of the intrapleural pressure before and after the aspiration of fluid or air. In this test if there is not communication between the pleural cavity and the bronchus, the intrapleural pressure will become more highly negative as air and fluid are removed. (*2*) Methylene blue, if injected into the pleural cavity in the presence of a bronchopleural fistula, will eventually appear in the sputum if careful search is made for it. (*3*) Gas analysis of the pneumothorax air may be done before and after the aspiration of a certain quantity of air from within the pneumothorax space. In the presence of a tuberculous parapneumothoracic effusion the pneumothorax air generally contains between 9 per cent and 14 per cent of carbon dioxide and less than 0.1 per cent of oxygen. Pneumothorax gas analysis is diagnostic of a bronchopleural fistula if the carbon dioxide is less than 5 per cent and the oxygen more than 7 per cent, or if the carbon dioxide is more than 9 per cent and the oxygen more than 1 per cent. These tests will reveal any bronchopleural fistula that is permanently open. However, intermittently open fistulas can be disclosed only by serial analysis of the pneumothorax air. To carry out this procedure a sample of pneumothorax air is removed and analyzed for carbon dioxide and oxygen. Immediately following this a quantity of air sufficient to reduce the intrapleural pressure to minus 24 cm. of water is removed. Then a second sample of air is analyzed for its carbon dioxide and oxygen content. In the absence of a bronchopleural fistula both samples should contain the same

amounts of these gases. Any significant differences are indicative of an intermittently open fistula, since by sufficiently reducing the intrapleural pressure the mouth of the fistula will open and alveolar or bronchial air will enter the pleural space, thereby materially changing the proportions of carbon dioxide and oxygen. In 44 of 100 cases of tuberculous empyema a bronchopleural fistula could not be diagnosed by any means. In the remaining 56, 27 were of the persistently open type and these were diagnosed equally well by all three methods. Twenty-nine were intermittently open and could be diagnosed only by the combined negative pressure and gas analysis test. By the careful use of these methods the incidence of bronchopleural fistulas in tuberculous empyema is found to be 56 per cent.—*Diagnosis of Broncho-Pleural Fistula in Tuberculous Empyema, D. Matsuzawa, Quart. Bull. Sea View Hosp., October, 1940, 6: 50.*—(*A. A. E.*)

Silicosis and Tuberculosis.—Roentgenograms of the chest of a thirty-six year old white male, complaining of dyspnoea and weight loss, showed large irregular hilar masses projecting from the mediastinum into the right and left lungs. The lungs were otherwise clear. Bronchoscopic examination revealed compression of the right major bronchus, apparently by an extrinsic mass. The clinical diagnosis was primary bronchogenic carcinoma with bilateral lymphatic spread. The patient died two months later. Necropsy disclosed silicosis and tuberculosis at the pulmonary hila and unresolved pneumonia. Chemical examination showed 9.2 mg. of silicon dioxide per gram of dry tissue which is far above the 1.13 mg. determined by McNally as the average content for normal lung. No history of exposure to dust containing silica was obtainable in this case.—*Silicosis and Tuberculosis Roentgenologically Simulating a Neoplasm, E. A. Pohle & G. Ritchie, Am. J. Roentgenol., January, 1940, 43: 42.*—(*W. H. M.*)

Mediastinal Herniation.—The mediastinal pleurae of the two hemithoraces are in close proximity in the retro-oesophageal space extending from the third to the fifth thoracic vertebrae. Mediastinal herniation may occur at this site when the intrapleural pressures on the right and left side are unequal. Less often, as in pulmonary tuberculosis, scar tissue contracture occurring in one pulmonary apex only, or more predominantly in one apex than the other, may cause traction on the mediastinal areolar pleural septum resulting in its displacement across the midline, usually with simultaneous shift of trachea and oesophagus in the same direction. The herniated lung may be incorrectly interpreted as representing a pulmonary cavity or an emphysematous bulla of the other lung. Following pneumonectomy, Rienhoff has described invagination of the posterior mediastinum by a lappet of right lung in front of the bodies of the vertebrae but behind the oesophagus. All instances of herniation in this region observed by the author have been from the right to the left side, possibly because the aortic arch protrudes toward the left and limits the shift of lung and mediastinum toward the right. Cases of pulmonary tuberculosis have been observed in which, following thoracoplasty without apicolysis, an appreciable amount of collapsed lung was present in the upper retro-eosophageal space.—*Roentgen Aspects of the Upper Retro-Oesophageal Pulmonary Borders, H. C. Maier, Am. J. Roentgenol., February, 1940, 43: 168.*—(*W. H. M.*)

Index of Activity.—For the diagnosis of an active bronchogenic tuberculosis, sputum, X-ray examination, determination of the erythrocyte sedimentation time and especially auscultation are necessary. However, cavities may give no physical signs when they are present in patients with destruction of the vocal cords, under pleural adhesions or near the hilum, in a lung with compensatory emphysema; when they are the result of slowly excavating primary infiltrations, in diabetics, and cavities whose draining bronchus is either narrowed or very wide. For the diagnosis of an active haematogenous tuberculosis splenic enlargement and fever may be more significant than the X-ray findings. Slight pleural involvement ("pleurite à répétition") often is not recognized by X-ray examination, but can be found by clinical examination. In

the cases of a masked tuberculosis, clinical and X-ray examination can be negative; there the tuberculin test is often of value. In such cases a specific treatment can bring relief in a short time.—*Wie erkennen wir, ob eine bestehende Tuberkuloseinfektion aktiv ist oder nicht? W. Neumann, Wien. klin. Wchnschr., September 27, 1940, 53: 785.*—(*G. C. L.*)

Follow-up in Tuberculosis.—The care of the ex-sanatorium patient remains a great problem. It has been shown that the longer the period of sanatorium care the higher the percentage of permanently rehabilitated cases. Several methods are suggested for the rehabilitation of tuberculous patients in Switzerland: (*1*) by way of gradually increasing occupational therapy, (*2*) by graduated work in the unemployment camps through arrangement with the directors of such camps, and (*3*) by tentative and part-time employment in regular industry. Strict medical supervision is practiced in all three groups. Whereas cases with positive sputum may be employed in many branches of industry without endangering the general population, it is suggested the chronic slowly progressive cases with positive sputum be not returned to regular industry but be confined to special colonies with opportunity to work according to their state of health. There is a need for creation of tuberculosis hospitals in Switzerland where operative cases, far advanced cases, or cases otherwise in need of hospital care should be treated by specialists. A placement agency for ex-patients is available. Continued follow up of expatients by the social service agency in close coöperation with the physician insures the largest percentage of permanent rehabilitations.—*Tuberkulose-Nachfürsorge, E. Bachmann, Schweiz. med. Wchnschr., December 7, 1940, 49: 1161.*—(*H. M.*)

Ultraviolet Radiation.—Irradiation with ultraviolet light is one of the most important factors in the arrest and treatment of intestinal tuberculosis. Following this treatment tubercle bacilli often disappear from the stools, pain and vomiting and nausea are relieved and the diarrhoea eventually may be cured. In the treatment of tuberculous peritonitis with ultraviolet light the best results are obtained in the ascitic type. In abdominal tuberculous lymphadenitis light therapy is inadvisable since in more than three-fourths of the cases it is possible to excise the affected lymph nodes. There is considerable controversy concerning the advisability of using ultraviolet irradiation in the treatment of pulmonary tuberculosis. In Europe it is used frequently. In the author's studies on 60 patients. the judicious employment of heliotherapy indicated that even haemoptysis was no contraindication to the use of ultraviolet irradiation. Even patients with far advanced pulmonary tuberculosis may be benefited by graduated exposure provided the patient's temperature does not rise above 37.5°C. The value of the mercury-quartz-vapor lamp in the treatment of pulmonary tuberculosis in children is great. However, the indiscriminate use of this method of treatment is fraught with great danger and it should not be used in toxic or rapidly advancing exudative types of disease. Ultraviolet irradiation is of particular value in the treatment of bone and joint tuberculosis and frequently surgical intervention will be rendered unnecessary after a proper course of heliotherapy. In tuberculosis of the genitourinary tract surgical treatment will provide prompt relief if it is combined with postoperative heliotherapy. Ultraviolet irradiation is of benefit in the treatment of tuberculous lesions of the eye and ear and should be used in conjunction with the surgical treatment of nasal lesions. In tuberculous laryngitis general and local irradiation are of great value.—*Medical Application of Ultraviolet Radiant Energy, F. H. Krusen, Ann. Int. Med., October, 1940, 14: 641.*—(*A. A. E.*)

Cavities and Collapse Therapy.—The roentgenological disappearance of a tuberculous cavity after collapse therapy is no proof of anatomical healing. Only few cases of healed cavities have been described in the literature. Collapse therapy first produces venous hyperaemia and lymph stasis. This has probably a favorable effect on the lung tissue and mobilizes its natural resources for the struggle against the infection. It creates bad living conditions for the tubercle bacilli and stimulates the de-

velopment of connective tissue. A similar process seems to take place in chronic pulmonary congestion (in cardiac and in kyphoskoliotic patients) where cavities are found rarely. It is believed that venous congestions and lymph stasis play an important rôle in the treatment of any purulent infection. Histological examinations were performed on tuberculous lungs of patients who had died after some form of collapse therapy. A dense net of afferent and efferent lymph vessels is seen around the cavities, with lymph stasis and imbibition of the cavity wall with lymph. Later on in this zone granulation tissue develops which is transformed into connective tissue. Obliteration of the cavity is effected by the growth of connective tissue slowly filling the cavity, by the development of septa of connective tissue through the cavity and by dehydration of the cavity. In the neighborhood of a cavity destructive, defense and reparative processes take place. After thoracoplasty the following observations were made: detritus from the retracted lung can produce dissemination of the disease even a long time after operation. Blood and lymph stasis in the retracted lung make for overexertion of the right heart, resulting in anatomical and functional changes. In some cases interstitial myocarditis was found, probably due to a tuberculous spread by way of the lymph vessels. Bronchitis, atrophy and necrosis of small bronchi are common. The lungs show atelectasis, the cavities shrink, but no anatomically healed cavity could be seen. Connective tissue develops throughout the tubercles and the pleura shows fibrosis. Emphysematous changes are found in the other lung. The anatomical results of plombage are similar. Compression of cavities in absence of a draining bronchus can cause the development of a pulmonary fistula. Histological examination of 56 phrenic nerves obtained by exairesis and of 11 phrenic nerves obtained at autopsy of tuberculosis patients was done. In some of them proliferation of the perineural and epineural tissue and degeneration of the medullary sheath and axis cylinder was seen. In 5 of 9 examined vagus nerves, degeneration of the medullary sheath was found. Histological examinations were made in 3 cases of tuberculous pneumonia who had died after phrenicoexairesis. The lungs showed an infantile structure. Lymph stasis and exudative and caseous lymphangitis was seen.—*Les changements histologiques de structure de caverne sous l'influence de la collapsothérapie et leur signification biologique, W. H. Stéfko, Rev. brasil. de tuberc., May-June, July-August, September-October, 1940, 9: 247, 311, 389.*—(*G. C. L.*)

Treatment of Tuberculosis of Lung.—The author summarizes some of the various forms of surgical collapse therapy of the lung which have gained acceptance as of established value. To realize the ultimate benefits of pulmonary collapse it must be combined with proper medical management, since collapse of the lung merely creates conditions that are favorable to healing. The first and simplest procedure is artificial pneumothorax. Its value is restricted to about 40 per cent of cases. Renal and cardiac failure, or extensive emphysema, are absolute contraindications. The duration of pneumothorax collapse is largely determined by the underlying pathological condition. In early cases without demonstrable cavity, from two to three years is probably the optimal period; in those with small and medium sized cavities, from three to five years, and in cases in which there are large cavities the collapse should be maintained for at least five years. Oleothorax is of value in the treatment of tuberculous pyothorax, and may also be used as a substitute for pneumothorax in cases in which premature loss of collapse is threatened. For this purpose 1 per cent of a preparation of cajuput in liquid petrolatum is commonly used. Pleuritic adhesions which prevent a satisfactory collapse of the lung are appropriate for surgical cutting in about 20 per cent of pneumothorax cases. Closed intrapleural pneumonolysis with the electrosurgical method has effected closure of cavities in approximately 70 per cent of more than 450 of the author's cases. Broad-based chest wall attachments are now more readily accessible electrosurgically. The author's electrosurgical technic has greatly decreased serous (less than 1 per cent) and purulent exudate (less than 3 per cent) formation. Interruption of the phrenic nerve is not nearly so widely used as formerly. Temporary phrenic surgery is now the method of choice. One gets gratifying

results from phrenic interruption when the disease is confined to the lower lung or perihilar region. In the author's series of more than 500 cases of phrenic neurectomy, 15 per cent—including patients with cavernous tuberculosis who were candidates for major surgery—recovered as a result of the phrenic operation. Extrapleural thoracoplasty should always be considered when other collapse procedures have failed. It is indicated when the disease is predominantly unilateral and of a productive or fibroid type, with or without cavity formation. The patient should be preferably under fifty years of age. The greatly improved and well group comprises approximately 60 per cent of the author's series of over 400 cases. The direct operative mortality has been less than 2 per cent. Extrafascial apicolysis is indicated in the case of apical and subapical cavities with dense fibrotic pericavity zones without exudative foci. It may be combined with an upper phase thoracoplasty. The author feels that the popularity of this operation is diminishing and only good risk cases should be subjected to it. Extrapleural pneumothorax is particularly valuable in apical or upper lung lesions in which a selective collapse would appear to be adequate and where intrapleural pneumothorax has been ineffective. It may be used in some cases in which thoracoplasty is contraindicated on account of age or general condition. It is highly selective and conserves healthy lung tissue. The necessity and danger of giving constant refills of air afterward often influences an extrapleural oleothorax. The author has developed an extrapleural procedure which eliminates most of these disadvantages. The extrapleural space is maintained by filling it with a pack fashioned of flexitissue, which, being completely inert when buried in the tissue, can be left in this space indefinitely. The pack should be left in place for from six months to two or three years. On removal the space behaves like an abandoned pneumothorax cavity and is filled either with a serous exudate or by the expanding lung. The necessity for refills is eliminated. The author employs the procedure in preference to a limited upper phase thoracoplasty in almost all cases. It is too early to evaluate the results of Monaldi cavity drainage. Lobectomy and pneumonectomy have been successfully employed in isolated cases.—*The Treatment of Pulmonary Tuberculosis, R. C. Matson, J. A. M. A., November 9, 1940, 115: 1620.*—(*G. L. L.*)

Pneumothorax.—The results of pneumothorax induced in 400 tuberculous patients over a period of nine years are analyzed. The patients were drawn about equally from the urban and rural communities of Northern Ireland. Over 99 per cent of the group could be followed for a period of at least five years after the attempted induction. The cases were divided into three groups: (*1*) S.C., satisfactory collapse, 131 patients; (*2*) N.S.C., not satisfactory collapse, 184; and (*3*) N.C., no collapse, 85. Of the 400 patients, 181 also underwent phrenic nerve operations; most of these were carried out in the last three years of the study period. The results in the latter period were much better than those in the earlier years, from the viewpoint both of effectiveness of collapse and of ultimate survival. Most of the phrenic operations were performed upon patients in groups 2 and 3. The operation succeeded in converting 35 cases from N.S.C. to S.C. In the S.C. group, pneumothorax was maintained from one to four years. Of the 131 patients in this group, 96 were X-rayed within two to five years after reëxpansion; in 82 the disease appeared to be quiescent, while in the other 14 there were signs of activity. Of the 14, 8 subsequently died. Of the 35 not X-rayed, 21 are known to be dead. The improvement in results in the last three years is attributed to greater use of phrenic operations and to improvements in general technique, especially in the management of obliterative pleuritis. The Jacobaeus operation was carried out in 10 cases. The late results in the N.C. group were better than those in the N.S.C.; those undergoing phrenic operations seemed to do better than the others. The authors feel quite satisfied with their results in view of the social circumstances and the admitted imperfections in technique.—*The Late Results of Artificial Pneumothorax in Pulmonary Tuberculosis, B. R. Clarke & S. L. W. Erskine, Quart. J. Med., October, 1940, 9: 323.*—(*A. G. C.*)

Selective Collapse.—Selective collapse of the involved lobe with replacement by expansion of healthy lobes has been frequently reported

in the course of artificial pneumothorax. The process may occur while the pneumothorax is being maintained or after it is discontinued. It must be due to preëxisting atelectasis increased by the release of tension by pneumothorax and section of adhesions. The exact pathogenesis is a matter for speculation. The interesting point is that the cavities heal permanently and the lung recovers a maximum of function. A report is given of the case of a male student of twenty-three with a right upper lobe cavity, who was treated with a negative pressure pneumothorax plus a Jacobaeus operation. Over a period of a year and a half, the pneumothorax being maintained, there was progressive collapse of the right upper lobe with gradual displacement of it upward and toward the mediastinum, together with upward displacement of the horizontal fissure and increase in size of the middle and lower lobes. The combination of selective collapse of the diseased lobe and pronounced tendency of the healthy lobes to expand connotes a good prognosis and calls for hypotensive pneumothorax with small refills.—*Dislocación lobular en el curso del neumotórax, J. M. Balbi Robecco, Rev. argent. de tuberc., April-June, 1940, 6: 78.*—(*H. B. S.*)

Fibrin Body.—A fibrin body may occur as a harmless sequel of hydropneumothorax and can be diagnosed only by roentgen examination. A case is reported of a pleural fibrin body, persisting for two years after the discontinuation of pneumothorax; the roentgenological appearance of the mass without a coexisting pneumothorax space led to a diagnostic problem. Among the conditions considered were fibrin body, calcified lung abscess, xanthoma, adencarcinoma of the lung, dermoid cyst and echinococcus cyst. Subsequently, the previous history and roentgenograms were obtained, reveal that the mass had not been present prior to induction of pneumothorax and that its evolution was preceded by an effusion. A diagnosis was then made of persisting fibrin body. Subsequent roentgenograms showed almost complete absorption of the fibrin body.—*Persistent Fibrin Body, A. Rest, Am. J. Roentgenol., March, 1940, 43: 360.*—(*W. H. M.*)

Marginal Density of Lung in Pneumothorax.—The usual roentgenographic picture of a partially collapsed lung in a pneumothorax shows peripherally an unusually penetrable area and medially an area of increased density due to a correposnding condensation of pulmonary tissue against the mediastinum, principally in the region of the hilum. The latter area, due to the atelectasis of the collapsed lung, assumes a density somewhat greater than that of the contralateral uncollapsed lung. An apparent reversal of this relationship of increased and decreased density is unusual. The production of this reversal depends on several possibilities: (*1*) partial pulmonary collapse by pneumothorax with marginal adhesion of the lung to both the anterior and posterior wall in case of thickening of the visceral pleura (adhesion to both anterior and posterior walls can, of course, be possible without thickening of the visceral pleura); (*2*) partial collapse, marginal adhesion to either the anterior or posterior wall without thickening of the visceral pleura (obviously if the visceral pleura is thickened, adhesions to only one wall would result in the interposition between tube and screen of an identical number of thickened pleural surfaces over both air and lung containing areas of the pneumothorax. As a result no margination could occur and the the entire hemithorax could show only the hourglass increase in density); (*3*) diffuse thickening of the nonadherent parietal pleura or the uniform deposition of fibrin upon its inner surface with or without the extension of this process to the exposed visceral pleura according to the conditions in (1) and (2); (*4*) absence of pleural thickening under the adherent areas of the lung.—*Paradoxical Roentgen Image in Pneumothorax, P. T. Knies, Am. J. Roentgenol., August, 1940, 44: 230.*—(*W. H. M.*)

Extrapleural Pneumothorax.—The history of extrapleural pneumothorax is reviewed and the operative technique is described. The necessity of the repeated removal of all fluid accumulations and frequent air refills is stressed. The complications cited are: large numbers of small haemorrhages producing a haemorrhagic serum which must be removed before adhesions appear; infections (pyogenic and tuberculous);

subcutaneous emphysema, which is not as extensive as might be expected. The disturbance of the operation to the patient is not alarming and the pain experienced is much less than that following thoracoplasty. The fat of the space is stated as follows: if small, it will be obliterated gradually as is also the case if bleeding is great and coagulation occurs; if a good collapse is obtained then the course depends on the underlying disease, but the author believes the lung will expand much the same as in intrapleural pneumothorax. Nine cases have been given extrapleural pneumothorax in the author's clinic with no deaths, although two patients had alarming postoperative haemorrhages, and the remaining seven showing fairly good results.—*Extrapleural Pneumothorax, C. A. MacIntosh, Canad. M. A. J., June, 1939, 40: 553.—(W. G. C. M.)*

Pneumonolysis.—In Sea View Hospital exploratory thoracoscopy and, if possible, intrapleural pneumonolysis are performed in every patient with artificial pneumothorax in whom positive sputum persists or in whom there is roentgenographic evidence of an uncollapsed cavity. Of 151 patients subjected to this procedure, 34 had only exploratory operations and the remainder had partial or complete division of adhesions. Sixty-one per cent of the cases had bilateral pulmonary tuberculosis and in 46 per cent of these bilateral cases the disease in the contralateral lung was uncontrolled. Perfect results manifested by negative sputum and no complications were obtained in 59 per cent of unilateral cases and in 48 per cent of bilateral cases with controlled disease in the contralateral lung. Good results manifested by negative sputum and with the development of only very mild complications were obtained in 11 per cent of unilateral cases and in 20 per cent of bilateral cases. Complications of all kinds occurred in 23.8 per cent. Of this number 4.8 per cent developed bronchopleural fistulae, 2 per cent developed empyema, 9 per cent developed clear fluid which contained tubercle bacilli in small numbers and 9 per cent developed clear and uninfected fluid. In 90 per cent of the patients in whom operation was performed with good results the conversion of sputum took place within four months after operation. It is felt that if the sputum remains positive after four months, other methods of collapse therapy should be used. Repeated efforts to divide adhesions in the same patient are relatively ineffective in converting the sputum and are accompanied by a high percentage of serious complications. Cases with large cavities have the lowest percentage of conversion of sputum and the highest percentage of complications.—*Complications of Closed Pneumonolysis, M. Stemmerman & I. Tchertkoff, Quart. Bull. Sea View Hosp., July, 1940, 5: 421.—(A. A. E.)*

Pneumonolysis.—The technique of pneumonolysis since its creation by Jacobaeus about thirty years ago is briefly discussed. As nearly 50 per cent of all pneumothoraces have adhesions pneumonolysis is at the present time a frequently used procedure. The lung should be collapsed by pneumothorax as much as possible so that the adhesions are stretched to thin bands. The operation is usually performed six to ten weeks after pneumothorax induction; it is not advisable to wait longer than three to four months. The complications are more frequent the longer the duration of the operation. Sufficient pneumothorax refills are necessary after pneumonolysis in order to avoid the development of new adhesions. The complications of 209 pneumonolyses within the last two years were: Serous exudate in 14 per cent of the cases, empyema in 3.4 per cent, progression of the disease in 1.7 per cent; 140 patients (67 per cent) had no tubercle bacilli in their sputa three months after the operation, 69 patients were still positive (partly due to disease of the other lung, partly because the pneumonolysis could only incompletely or not at all be done).—*Der gegenwärtige Stand der Thorakokaustik, H. Weber, Wien. klin. Wchnschr., January 24, 1941, 54: 68.—(G. C. L.)*

Pneumonolysis.—A complete collapse of a lung is only achieved if the lung can withdraw concentrically to the hilum. Major cavities in the upper lung remain open if adhesions in the upper medial part of the lung permit only a transverse collapse and prevent a complete collapse of the lung. Pneumonolysis is difficult and dangerous in the medial region. Out of 500

pneumonolysis cases between the years 1935 and 1939 there were 190 with adhesions at the major vessels in the thorax. In 88 cases there were adhesions in the medial region in immediate neighbourhood of the great vessels. The medial adhesions were successfully severed in 73 per cent of the cases. Of the medial adhesions, 14.5 per cent were in the anterior part and 85.5 per cent in the posterior part, the separating line being formed on the left side by the aorta and the subclavia, on the right by the vena cava. Adhesions which according to their length and structure could be severed if they were in the range of the osseous thorax, can also be severed if they insert in the medial region on a big vessel. It is of importance always to make the pneumonolysis in the direction away from the vessel, never in the direction of the vessel. Three cases are extensively discussed in which a complete severance of medial adhesions was not possible and where, therefore, only a partial collapse was achieved. Then the description is given of 7 cases in which by severance of all the adhesions a complete collapse could be achieved. In over 400 cases of medial pneumonolysis there was not seen a severe or fatal haemorrhage. Injury to the phrenic nerve occurred twice and in 2 cases injury to the sympathetic nerve was observed. No other injuries or complications occurred.—*Thorakokaustik im medialen Gebiet, G. Herholz, Ztschr. f. Tuberk., September, 1940, 85: 65.*—(*G. C. L.*)

Results of Thoracoplasty.—From 1933 to 1939 450 thoracoplasties were performed by one of the authors in 219 tuberculous patients (110 women and 109 men). The age of the patients was thirteen to fifty-five years, the average being thirty years and nine months. Eight patients (3.6 per cent) died immediately after the operation. One hundred and ninety patients could be followed up. In 49 patients a total thoracoplasty was done, in 32 patients the first 3 to 4 ribs were removed, in 18 patients 5 ribs, in 49 patients 6 ribs, in 31 patients 7 ribs, and in 16 patients 8 ribs. Anterior thoracoplasty after Monaldi was done in 3 patients. The fifth to the tenth rib were removed in one patient. One hundred and four patients (52.3 per cent) were cured with negative sputum. Thirty-three patients (16.6 per cent) were markedly improved. Twenty-one patients (10.5 per (cent were unchanged or showed progression. The least number of cures (37.5 per cent) was found in the patients with the 8 rib thoracoplasty. The total thoracoplasty effected a cure in 53.1 per cent of the cases. Seventy-one patients (35.7 per cent) were able to perform their former work after the operation. Thirty-three (16.6 per cent) of the operated patients died, most of them due to postoperative bronchogenic spread. This complication occurred altogether in 52 patients (26.1 per cent); it happened only when the surgery had been started over the apex, never when the operation had been begun over the lower part of the lung. It is, therefore, recommended to do a lower thoracoplasty as first stage. The presence of infraclavicular râles is a contraindication to an apical thoracoplasty. If large cavities are present or if the pathological process is extensive, total thoracoplasty should be planned from the beginning.—*Dauerergebnisse thoracoplastischer Eingriffe bei Lungentuberkulose, H. Gaerber & H. Kunz, Wien klin. Wchnschr., November 22, 1940, 53: 957.*—(*G. C. L.*)

Cavities after Thoracoplasty.—It is often a very difficult problem to identify cavities in patients in whom the sputum remains positive after two or more stages of a thoracoplasty. Following a thoracoplasty the interpretation of roentgenograms of the lung is confusing because of superimposed shadows of degenerated bone, thickened pleura, rib fragments and areas of pulmonary fibrosis. Tomograms have not proved very satisfactory. This study was therefore undertaken to devise a suitable method for identifying cavities remaining after a thoracoplasty. The method depends upon the fact that the presence of a fluid level within a suspected cavity is proof that the suspected area is actually an intrapulmonary cavity. Only patients with persistently positive sputum after a thoracoplasty were studied. The night before examination the patient was given a sedative and instructed not to expectorate in the morning. The following morning roentgenograms were taken with the patient in the upright position and tilted to either side. Eighteen patients were studied by this method

and fluid levels were demonstrated in 7, 38.8 per cent. Identification of cavities in these 7 patients was made possible by the fact that the fluid level of the sputum within the cavity shifted when the patient's position was changed. —*Visualization of Cavities in Post-Thoracoplasty Lungs, J. L. Leon, H. Green & C. A. Serbst, Quart. Bull. Sea View Hosp., January, 1941, 6: 197.*—(*A. A. E.*)

Perforation of Pleura in Thoracoplasty.—This accident is most likely to occur in cases operated relatively early in the disease, when pleural thickening and adhesions are not likely to be present. It is very apt to occur, for the same reason, in cases operated in the presence of residual pneumothorax. When the operation is done for empyema, such perforation is unlikely, due to the presence of pleural thickening. Six accidental perforations of the pleura are reported in a series of 100 operations. Two occurred among the 90 cases where there was no previous pneumothorax, and 4 in the 4 cases in which artificial pneumothorax had been abandoned as unsatisfactory but in which some air was still present in the pleural cavity. In 6 cases in which pneumothorax was purposely maintained at the time of operation, no such accidents occurred. The perforation usually occurs during removal of the periosteum of the first rib to be resected. Almost always it is due to indirect trauma, resulting in a small tear which is difficult to detect. On the operating table, signs of perforation are a peculiar hissing sound synchronous with perspiration and bubbling in the extravasated blood during expiration. Where perforation of the visceral pleura is suspected, and the patient is under general anesthesia, one can test for it by increasing the gas pressure and watching for the escape of gas through the parietal perforation. This test was negative in the 6 cases described. In the absence of perforation of the visceral pleura, infected material does not gain access to the pleural cavity. However, in addition to the air, a variable amount of blood enters from the operative area. If a pleural perforation occurs, the operation should be continued with care. Some surgeons advise keeping the first two ribs if the patient's condition is poor or if there are contralateral lesions, to prevent mediastinal displacement. Fluid should not be run into the operative bed, lest it enter the pleural cavity. The wound should be drained to prevent serohaemorrhagic accumulations which likewise gain access to the pleural space. Symptomatology is variable. Where perforation is caused by the cut end of a rib, there may be a sudden onset of pronounced symptoms after the patient has returned from the operating room. But no symptoms at all occur where collapse is very limited because of pleural adhesions. Subjectively, patients complain of dyspnoea, which may be sudden in onset, substernal oppression and deep pain in the operated side. Signs are rapid, weak pulse, cyanosis, rapid superficial respiration and preference for the sitting position. The picture must be differentiated from surgical shock. In this differentiation, the presence of substernal pain, dyspnoea and cyanosis are important. Routine radiography should be done in all thoracoplasties because physical examination will not always establish the diagnosis and disturbs the patient unnecessarily and because it will detect postoperative pneumothorax before it progresses to cause clinical symptoms. The X-ray picture shows the extrapleural cavity and an intrapleural collection of air and fluid. Usually the mediastinum is displaced toward the opposite side. If the perforation is high, the fluid remains in the extrapleural cavity. Treatment consists of one or more aspirations to evacuate sufficient air and fluid to relieve symptoms. It is probably best to repeat the procedure until all possible fluid is removed, as haemothorax seems to favor later calcification. Where treatment is adequate, prognosis is good. Three of the 6 cases recovered spontaneously, the others after puncture. The collapsed lung always reëxpanded to the extent permitted by the thoracoplasty. Details of the 6 cases are reported, with X-ray films of 3 of them.—*Perforaciones de la pleura parietal en la toracoplastia (Hemoneumotórax operatorio), A. A. Cetrangolo & A. N. Bracco, Rev. argent. de tuberc., April-June, 1940, 6: 63.*—(*H. B. S.*)

Intracavitary Drainage.—A special Y-shaped trocar, 20 cm. long is used for this operation. Near the distal end of the trocar's cannula, and laterally to it, there is a small circular opening

designed to allow intracavitary pressure readings by means of a water manometer connected by rubber tubing to the proximal end of the straight cannula. The cannula is graduated in centimeters, from 1 to 14, from the distal end of the shaft. The angular branch, near the proximal end of the cannula, is intended to receive the stilet. The stilet is made of steel wire and ends in a point shaped like a triangular pyramid; the greatest cutting power is at the tip and its base is rounded to fit the distal end of the cannula. The stilet does not interfere with the round opening used for pressure readings. There are 4 sizes of trocars, from 2 to 12 mm. in diameter. The trocar permits piercing of the pulmonary parenchyma without becoming plugged; it reaches considerable depths that are measured with precision by the external graduation; it checks, by means of the manometer, all intrathoracic pressure variations, including those characteristic of the cavity; and permits, after removal of the stilet, the introduction of the specially graduated rubber sound, that is used for the aspiration. There are 4 sizes of these sounds, corresponding to the 4 sizes of the trocar's diameter. The experience gained from the first 100 cases establishes the fundamental technique. For obvious reasons, the performance of this treatment is subordinated to absolute pleural symphysis, especially at the site of choice for the introduction of the trocar. Two more factors have also some practical value. One is the skeletal and muscular development of the thorax, because the operation will be technically easier in thoraces with visible interspaces and with thin walls than in those with thick muscular or heavy fat covering. In the latter cases it may even become necessary to prepare the field by dissecting down to the parietal pleura. The other factor is the anatomical integrity of the thoracic walls. When operating on normal walls we can avail ourselves of our knowledge of topographical anatomy, but when, for instance, the relations of important neurovascular structures are altered, we must proceed with great caution and under a more diligent radiological control, using tomography if necessary. As a rule, the anterior approach is the best; only exceptionally is the posterior approach preferred. Radiological studies will determine the true location of the cavity to be attacked. Preoperative preparation is usually unnecessary, but in some cases the physical findings or the general condition of the patient suggest administration of a stimulant or of a sedative. The patient is placed in the horizontal position of the fluoroscopic table, and the cavity is localized. After local anesthesia with .5 per cent solution of novocaine, a thin needle 12 cm. long, and attached to an ordinary 2 cc. syringe, is thrust in the selected interspace, perpendicular to the plane of the table. As in pneumothorax refills, the free action of the piston of the syringe will reveal that the needle has entered the cavity. The length of the needle used to enter the cavity is measured. The needle is withdrawn and the special trocar is thrust in for the desired length, after a small incision of the skin. Free manometric oscillations are observed as soon as the point of the trocar is in the cavity. Fluoroscopic control will confirm the fact. The stilet is removed and the manometric tube is disconnected, and the rubber sound is quickly introduced through the cannula of the trocar. By connecting the manometric tube to the rubber sound the same manometric oscillations should be had; if not, it may be necessary to remove possible kinks that the sound may have formed in the cavity, or it may be wise to use a syringe to aspirate some of the exudates that may be obstructing the opening of the sound. The cannula is extracted and the sound is left in the cavity, securing it to the chest walls by a strong silk thread and adhesive strips. The outer opening of the sound is closed with a forceps. After the operation the patient is transferred to his bed and instructed to lie in a semi-reclining position, in practical immobility. The next day aspiration is begun by means of the usual system of water bottles, creating an even endocavitary pressure of between -15 and -30. A small bottle, to collect secretions from the cavity, may also be used. Dressing is renewed every second day, while in the interval the protective gauzes are saturated with some disinfectant solution. The anchoring silk thread is changed every week. As a rule no incidents complicate this operation: in the first twenty-four hours there have been occasionally blood-tinged secretions, either from the mouth or the sound, but never with bad results.—

Strumentario e tecnica per l'attuazione del procedimento di aspirazione endocavitaria di Monaldi, G. Bottari & G. Babolini, Ann. dell'Istit. Carlo Forlanini, May-June, 1939, 3: 365.—(S. L.)

Intracavitary Drainage.—Basing his conclusions on a review of the experiences of various experimenters, Parodi believes that the mechanism of healing following intracavitary aspiration is due to reflex neural reactions of the organ. The volumetric reflex affects the whole lung, no matter where the stimulus is applied; but the vasomotor reflex, a consequence of the volumetric variations and parallel to them, is of greater intensity at the site of the greatest stimulation. This is one reason for a local greater vasodilatation that may prove beneficial in intracavitary aspiration by favoring the processes of resorption; but, on the other hand, this may also represent the stimulus for a dissemination of the disease to the whole lung. Results from these reflexes on the lung and on the pulmonary circulation are not permanent, even with repeated stimulations; therefore, beneficial results from intracavitary aspiration cannot be but ephemeral. One cannot speak of cicatrization of cavities by this method; only of an apparent radiological obliteration of the cavities due to emphysematous reaction of the atelectatic alveoli delimiting the destroyed parenchyma. Cavities reappear within a period of time, just as they often reappear following any other method of treatment. Intracavitary aspiration still has a disputable value: it should not be overestimated and it is not as harmless as Monaldi would make us believe. Its therapeutic value is limited to reflex vasomotor and visceromotor actions.—*A proposito della aspirazione endocavitaria, F. Parodi, Riv. di pat. e clin. d. tuberc., July, 1939, 13: 511.—(S. L.)*

Intracavitary Drainage.—This report contains some observations gathered during the treatment of the first 100 cases. While at present only general directions may be drawn from these observations, one can learn some useful points for further practise. The management of intracavitary aspiration must look towards obtaining the benefits that constitute the theoretical basis of this procedure. Such benefits may be summed up as follows: to obtain homogeneous reëxpansion of the atelectatic pericavitary parenchyma; the subsequent overdistension of the surrounding pulmonary tissue, designed to complete elision of the cavity, must be gradual and devoid of undue trauma; aspiration must proceed so as to favor drainage of exudates, when areas of infiltration surround the cavity. Then, the procedure must be carried so as to obtain complete detersion of the walls of the cavity, with removal of pathological materials and with the elimination of the bacterial contents. The repercussion of the aspiration on the small pulmonary vessels should not embarrass the function of the right heart and should never overcome the power of resistance of the blood vessel walls. Finally, approximation of the cavity walls must be obtained and maintained in such manner as to help the development of the cicatricial process. These results may be obtained by slightly different methods of technique, according to individual conditions. When the surrounding parenchyma is adequate, be it atelectatic or healthy, a concentric reduction of the cavity will be possible; the procedure is easy and the aspiration causes no trauma or structural alterations. If, on the contrary, the surrounding parenchyma is inadequate, the retraction of the cavity cannot occur homogeneously; because aspiration acts equally over all surrounding tissues, there follows that in these cases the intracavitary pressure should not be so highly negative as to damage those areas that are ill provided with pulmonary tissue. A low negative intracavitary pressure should also be used when treating a cavity surrounded by exudative parenchymal lesions and elision of the cavity should be made very slowly. Thin-walled cavities have a tendency to close too quickly and will require lower intracavitary pressures; thick-walled ones require higher negative pressures and take a longer period of time to close. Detersion of the cavity walls should be closely watched and fast retraction should be avoided until several days after the products of aspiration are free of necrotic and caseous materials and even of thick secretions. To avoid damage to the walls of small blood vessels and disturbance to the function of the right heart, initial intracavitary pressure should be low. In one patient a pressure slightly over

−10 caused dyspnoeic episodes and a true syndrome of decompensation of the lesser circulation, and the treatment had to be discontinued; this patient died, and at the autopsy a slight mitral stenosis was found, which had not given previous objective findings. Homolateral lesions are often improved by this treatment; therefore, it would seem advisable to employ additional measures only after aspiration has been discontinued. Contralateral lesions may receive concurrent treatment, either by collapse therapy or by intracavitary aspiration, whenever the type of the lesions is destructive or already cavernous. While carrying on this treatment, chest films should be taken every eight to ten days, in order to follow the process of retraction of the cavity or to detect any eventual pericavitary exudative reaction. Ordinarily some fever is noted the first two to four days of treatment; protracted fever in patients formerly apyretic, should be considered abnormal. Recurrence of fever during treatment may mean either exaggerated intracavitary retention with resorption of toxic products, or retention of purulent material, due either to temporary closure of the draining bronchus or to insufficient aspiration because of poor position of the rubber sound. The appearance of scattered râles in the treated lung, or of basal râles in either or both lungs, is an index of impaired function of the right heart and of the small pulmonary vessels around the treated area. In such cases treatment should be interrupted at once; though it may be resumed later, proceeding more slowly and gradually. When this treatment is beneficial cough and sputum should rapidly decrease. When the draining bronchus is patent and its diameter is larger than that of the sound, a more rapid aspiration of air should be employed. Better and quicker results are obtained when there is stenosis of the draining bronchus. As a rule between −15 and −30 on a water manometer will be sufficient for intracavitary aspiration in most cases; it may be necessary to increase the negative pressure towards the end of the treatment. Pressures are maintained or modified by means of the usual two intercommunicating bottles of Mariotte, with a water manometer situated along the rubber tube going from the sound to the highest bottle. The rubber sound should be carefully and frequently checked for position and patency. Decision as to removal of the sound is most important. Very often the process of intracavitary retraction and filling will gradually push the sound out; if this does not occur, the sound should be gradually withdrawn and finally removed, after satisfactory clinical evidence, supported by radiological observation, of closure of the cavity. These suggestions and observations are not final, but serve as a guide to those who wish to experiment with this new method.—*Alcune osservazioni sulla condotta del procedimento di aspirazione endocavitaria, V. Monaldi, G. Bottari & G. Babolini, Ann. dell'Istit. Carlo Forlanini, May-June, 1939, 3: 374.*—(*S. L.*)

Intracavitary Drainage.—In a patient with a giant cavity of the right upper lobe a three stage thoracoplasty with removal of nine ribs was performed. However, the cavity did not collapse and an increase in expectoration followed. Therefore, intracavitary drainage was instituted. The patient's condition improved rapidly. After six weeks the tube was removed; eight days later the wound closed. The cavity disappeared and the sputum turned negative.—*Kavernensaugbehandlung bei Restkavernen, W. Kremer, Ztschr. f. Tuberk., June, 1940, 85: 11.*—(*G. C. L.*)

Intracavitary Drainage.—A preliminary report of the treatment of tuberculous cavities by continuous suction drainage is presented. The treatment is based upon the physiology and biology of cavities. It is maintained that the size of cavities depends upon the pressure changes within the cavity itself, rather than upon the loss of substance of the pulmonary parenchyma. These pressure changes are due mainly to the existence of a narrowed bronchus draining the cavity. During inspiration, the pressure within a cavity is negative, but the force of the lung as a whole during this phase of respiration, the so-called respiratory trauma of Morelli, exerts traction on the cavity walls and prevents their closure. To overcome this, certain types of thoracoplasty have been devised with varying degrees of success. During expiration, furthermore, the pressure within a cavity becomes positive and produces disten-

tion of the cavity walls. This distention results in an atelectasis of the pericavitary tissue with an additional increase in the resistance of the cavity wall and an impairment of its circulation. By the maintenance of a constant negative pressure within a cavity, however, the pericavitary atelectatic tissue is permitted to reëxpand, thus improving the circulation of the cavity wall and producing various biological conditions necessary for healing; respiratory trauma is diminished; and cavity distention is prevented. The space occupied by the cavity is filled gradually by the reëxpanded tissue and approximation of the cavity walls occurs. By continuous suction drainage the dead tissue of the cavity wall, where it has been shown tubercle bacilli accumulate, is expelled, and with the expulsion of these necrotic tissue elements the normal pH of the blood is restored within the cavity, a condition unfavorable for the growth of tubercle bacilli. Eventually the secretion from the cavity becomes free of bacilli. The technique of suction drainage consists in the insertion of a Y-shaped trochar into the cavity after exact localization by X-ray. One branch of the trochar is attached to a manometer, and through the other a rubber catheter is passed into the cavity and attached to a siphonage system which provides constant suction. A flask is placed between the catheter and the siphonage to collect the secretion. The operation is considered simple, and haemorrhages or other accidents have not occurred. After the discontinuation of the treatment no fistulae have remained. The secretion from the cavity is at first purulent and contains blood from the operative trauma and is followed by the drainage of detritus and caseous material, which later becomes serous or serosanguineous and contains no tubercle bacilli. At first the pH of the secretion is low, under 7.0, and remains so without variation until caseous particles appear, and then it becomes normal. The patients improve symptomatically and expectoration disappears. The case histories of two patients in whom suction drainage was used are presented. Cavity closure was obtained within three months of the termination of the treatment. The method is not recommended for hopelessly rigid cavities, for extensively destroyed lungs, or in patients with cirrhotic lungs.—*Über die Saugdränagebehandlung tuberkulöser Lungenkavernen, V. Monaldi, Ztschr. f. Tuberk., May, 1939, 82: 273.*—(*A. B. C.*)

Intracavitary Drainage.—This simple method, involving little financial outlay, permits easy and assured treatment of pulmonary cavities with minimum trauma. The cavities are brought to quick closure; more serious surgery is avoided. The operation does not present special difficulties and is void of dangers when correctly applied. Sisti was able to do it bilaterally, the same day, on a patient with haemoptyses, using the sound, employed in the aspiration, to introduce also coagulants directly into the cavity. Intracavitary aspiration should be gradual, but causes no haemorrhages even if forced; at most the secretion becomes somewhat haemorrhagic. Constitutional reactions are usually absent; any febrile reaction is but transitory. Cough and expectoration diminish; the latter becomes more fluid, mostly saliva and negative for bacilli, until it disappears as the aspiration proceeds. The material aspirated through the sound at first is thick and rich in caseous debris, then thinner and serous or serosanguineous. Fever and toxaemia soon disappear, general condition improves, weight increases, appetite returns; in other words, there is noted a progressive detoxification of the whole organism and a gradual return of resistance. Sisti reports on 6 cases treated by this method since February, 1939; in 2 of these patients he was able to continue concurrent contralateral pneumothorax without discomfort to the patients.—*Contributo clinico al "procedimento di aspirazione endocavitaria alla Monaldi," M. Sisti, Tuberculosi, July, 1939, 31: 243.*—(*S. L.*)

Intracavitary Drainage.—The practice of intracavitary aspiration has until recently been confined to Italy. Publications dealing with it are few. The concepts presented are an extract of these publications and of notes on personal conversations with Professor Monaldi in 1939. Of fundamental importance in the maintenance of a tuberculous cavity are respiratory trauma and parietal traction. Lung tissue is constantly subjected to the centrifugal pull of the inspiratory muscles (respiratory trauma) and to de-

forming movements, differing in plane and amplitude in different parts of the lung, as the organ follows the movements of the thoracic wall (parietal traction). These stresses are counterbalanced normally by the elasticity of the lung tissues, a free pleural space and easy penetration of air through the respiratory passages to the alveoli to compensate for changes in tension. Alterations in lung tissues, pleural adhesions and bronchial stenosis impede these mechanisms and thus increase respiratory trauma. Most cavities do not communicate freely with the outer air due to stenosis of their draining bronchi. As a result, in inspiration the prejudicial parietal pull on the wall is not entirely neutralized. In expiration, tension in the cavity increases. This, operating in opposition to the parietal motion, tends to compress the tissue about the cavity. This atelectatic pericavitary tissue is of major importance in the filling in of a cavity when a process of intracavitary retraction begins. An important factor in cavity closure is the intrinsic tendency of the shell of the cavity to contract. The existence of this tendency is supported by various anatomical, physiological and clinical observations but especially by the results of the anterolateral elastic thoracoplasty of Monaldi. This procedure consists of the removal of very small pieces of rib at the points of maximum movement, combined with diaphragmatic paralysis. Although no diminution in the size of the thorax is produced, cavities will close. Thus the wall of the cavity must have in itself greater centripetal tension than normal pulmonary tissue since it closes against the parietal traction which has been partially neutralized by the operation although the normal lung tissue remains distended. For various reasons a truly rigid cavity seldom occurs. Elasticity of the wall of the cavity, its tendency to contract and the ability of the pericavitary tissue to expand all create a tendency to closure of the cavity. Increased negativity of pressure within the cavity enhances this tendency. Monaldi's procedure, taking advantage of the usual stenosis of the communicating bronchi, creates such a negative pressure by the introduction by a transparietal route of a small rubber catheter into the interior of the cavity. The catheter is attached to a system of two bottles arranged to produce suction and a third interposed bottle to trap secretions. The catheter is introduced by a special trochar designed by Bottari and Babbolini. This consists of a Y-shaped metallic sleeve and a trochar of steel. The second limb of the Y serves for manometric readings. (Further technical and practical details will be discussed in subsequent articles after the benefits of the method have been substantiated.) In addition to the mechanical effect, the procedure provides increased blood supply to the wall of the cavity by relieving pressure upon this tissue, drainage of necrotic tissue, alteration of pH, elimination of tubercle bacilli from the secretions of a cavity, insuring permanent healing and elimination of toxic elements, thus preventing their absorption and producing improvement in the general condition of the patient.—*El tratamiento de la caverna pulmonar tuberculosa por la aspiracion endocavitaria de Monaldi, F. Roma & C. Bulnes, Aparato respir. y tuberc., January-March, 1940, 5: 5.*—(*H. B. S.*)

Intracavitary Drainage.—The physiological and pathological principles underlying the use of the Monaldi method are discussed, with stress on respiratory trauma and the various degrees and planes or lines of traction strain. A cavity can be closed when its retractive capacity is superior to the several centrifugal forces operating against closure. The author describes 2 cases out of an experience with 90 cases in the Forlanini Institute. The technique is not described; the author reserves a description for a future publication. The 2 cases presented illustrate the theory of the operation and indicate its possibilities in the drainage of cavities. It is freely admitted that the cavity is but one of the severe manifestations of pulmonary tuberculosis and that the obliteration of cavities does not signify the termination of the tuberculous process. The change in the character of cavity fluid after repeated drainage, from purulent to serous, is emphasized as analogous to that occurring in the continued drainage of an empyema cavity.—*El tratamiento de la caverna pulmonar tuberculosa por la aspiracion endocavitaria, M. Jimenez, Rev. mex. de tuberc., 1939, 1: 5.*—(*E. R. L.*)

Intracavitary Drainage.—The Monaldi procedure of transpleural intracavitary drainage depends upon the creation of a more negative pressure in the cavity than that which exists in the surrounding alveoli. By this method a cannula with a lumen larger than that of the draining bronchus is inserted into the cavity and suction applied so that air will leave the cavity at a more rapid rate than it can enter through the bronchus. If the bronchus is very large, more vigorous suction will be essential in order to maintain a proper degree of negative pressure within the cavity. The most satisfactory source of suction is through a suction pump and a Davidson pressure regulator and trap. The technique of the procedure is first to locate the cavity definitely by fluoroscopy, roentgenograms and tomograms. With local anaesthesia an exploratory needle is then introduced into the cavity and this is followed by a Davidson trocar and cannula. The cannula is then connected to the suction apparatus and to a mercury manometer. A metal cannula has been found most satisfactory since this will allow frequent inspection of the cavity by means of a modified thoracoscope. The cavity wall at first appears irregular and lined by caseous material. As the cavity becomes cleaner, areas of caseation are replaced by areas with increased vascular supply and the bronchial openings become smaller. During the first few weeks negative pressure of about 6 to 10 cm. of water is used. Eight cases have been treated by this method and good results have been obtained in only 2. In these practically complete closure of the cavity was obtained and it is of interest that in both of these patients the draining bronchi were practically closed at the time the cannula was introduced. Two cases had a posterior thoracoplasty following drainage and one of these died six days after operation of a massive wound infection. Of the remaining 4 patients, one died seven weeks after cavity drainage of massive haemorrhage from a pulmonary artery. In another it was necessary to discontinue drainage because of a severe haemorrhage from the chest wall around the metal cannula, and in the remaining 2 the drainage failed to materially reduce the size of the cavity.—*Modified Instruments and Technique in the "Monaldi Procedure," L. R. Davidson, Quart. Bull. Sea View Hosp., July, 1940, 5: 385.—(A. A. E.)*

Intracavitary Drainage after Thoracoplasty.—A considerable number of cavities do not heal after thoracoplasty. Thoracoplasty may cause a kinking of the draining bronchus which by a valvular mechanism may result in an increased pressure in the cavity. By Monaldi's procedure of intracavitary drainage the pressure in the cavity is decreased and the healing process furthered. The technique of the procedure is described. Four patients with cavities remaining after thoracoplasty were treated with intracavitary drainage. In 2 patients the cavities shrunk to a minimal size and the sputum and drainage became free of tubercle bacilli. In 2 other patients the treatment was not yet finished. The use of the intracavitary drainage for the treatment of uncollapsed cavities, also some years after thoracoplasty, is recommended.—*Über Restkavernen nach Thorakoplastik und ihre Behandlung mit der Kavernensaugdrainage, A. Schuberth, Ztschr. f. Tuberk., September, 1940, 85: 87.—(G. C. L.)*

Cavernoscopy.—An apparatus is described by means of which the interior of pulmonary cavities can be observed. It is of help at the intracavitary drainage, as it makes it possible to see whether one is in the cavity. A description of Monaldi's procedure of the intracavitary drainage is given.—*Über einen Spezialapparat für die endoskopische Untersuchung der Tuberkulosen und zur innerkavernösen Aspirationstechnik nach Monaldi, J. Abelló, Ztschr. f. Tuberk., June, 1940, 85: 1.—(G. C. L.)*

Diabetes and Pulmonary Infection.—The true nature of the lowered resistance to infection associated with diabetes is not clearly understood. Various theories have been advanced. At present, it is felt that the lowered resistance to infection in diabetics is primarily an aspect of faulty metabolism of the tissues. Greater inflammatory reaction and necrosis have been demonstrated in the traumatized skin of diabetic dogs than in nondiabetic controls. The metabolism of vitamins A and C is thought to be defective in diabetics. Both of these vitamins are concerned in the maintenance of tissue

integrity against infection. Clinically, the severity of pulmonary infection, both tuberculous and nontuberculous, is a matter of common observation. Special attention should be given to the rôle played in pulmonary infection by deficiency of the pancreas when it is caused by chronic disease of the parenchyma with extensive atrophy. In such cases fatty diarrhoea is associated with diabetes, bringing about severe emaciation and physical debility. Severe pancreatic deficiency of long duration in the adult is best exemplified in pancreatic lithiasis. There have been numerous reports concerning the severity of pulmonary tuberculosis in cases of pancreatic lithiasis. Only one well defined case of nontuberculous pulmonary disease in association with pancreatic lithiasis has been described in the literature. The author describes another such case which came to autopsy. The patient was a fifty-four year old man with a five year history of attacks of epigastric pain. In the latter months of his illness he had a persistent diarrhoea, and diabetes was discovered. Cough and expectoration developed three months before his death. He entered the hospital with extensive pulmonary signs and died within thirty-six hours. The pancreas contained numerous calculi and was completely fibrotic. The entire right upper lobe exhibited grayish-white consolidation with numerous large areas of partial or complete liquefaction necrosis. Bacterial stains of the necrotic portions revealed enormous numbers of gram-positive bacilli suggestive of *Bacillus subtilis* and very short gram-negative bacilli. There were no tubercle bacilli in these areas. Within the right lung there were also a number of small tuberculous foci which were also affected by the necrosis. Necrosis in the presence of inflammation generally depends on two factors, the destructiveness of the bacterial agent and the destructibility of the host's tissues. In diabetics, the latter factor plays an important rôle. Necrosis in pulmonary infection has been described in a wide variety of clinical entities such as suppurative bronchopneumonia, putrid abscess, interstitial and dissecting pneumonias produced mainly by haemolytic streptococci, and dissecting necrotic pneumonia in which the necrosis is massive, similar to the case reported. It may often be difficult to differentiate these necrotic infections from pulmonary tuberculosis particularly when the latter is of the florid type. —*Pulmonary Infection and Necrosis in Diabetes Mellitus, S. E. Moolten, Arch. Int. Med., September, 1940, 66: 561.*—(*H. R. N.*)

Nonputrid Suppuration of Lung.—Nonputrid pulmonary suppuration differs from simple bronchopneumonia by the occurrence of necrosis of the pulmonary parenchyma. The cases may be grouped into diffuse suppuration without abscess, segmental abscess and multiple abscesses. About 50 per cent of the cases of nonputrid abscess reach the radiologist when pleural complications have already occurred which obscure the pulmonary lesions. A roentgenological diagnosis of the underlying abscess is then not possible unless air and fluid are present in the pleural cavity. In this case the presence of a perforated abscess can be inferred. In a group of 20 cases of nonputrid pulmonary abscess in which fluid levels were shown, 50 per cent showed a single level, 40 per cent numerous levels within a segmental pneumonia and 10 per cent multiple levels in a diffuse bilateral pneumonitis. This does not give a correct estimate of the incidence of the diffuse disease because many cases are not recognized clinically whether cavitation is present or not. Cavitation is recognized often only by routine serial roentgen examination of cases of mild or moderately severe bronchopneumonia in which resolution is taking place slowly. It is believed that in some cases an emphysematous bleb is present rather than a true abscess. Occasionally the abscess cavity persists and is converted into a pseudocyst if the inflammatory process subsides. Destruction of the elastic tissue of the bronchioles is a constant feature of suppurative bronchopneumonia, and bronchial dilatation occurs regularly. However, mild bronchial dilatation is not necessarily permanent. Many of the cases studied showed restoration to normal within one year.—*The Roentgen Aspects of Nonputrid Pulmonary Suppuration, M. L. Sussman, Am. J. Roentgenol., September, 1940, 44: 345.*—(*W. H. M.*)

Lung Abscess.—A pulmonary abscess is a circumscribed suppuration arising within the lung resulting from inflammation accompanied

by a varying amount of destruction of pulmonary tissue. Clinically and therapeutically, this process is to be differentiated from diffuse pulmonary suppuration, multiple abscesses arising in the course of a sepsis, and suppuration arising within a preëxisting cavity such as an hydatid cyst or a congenital cyst. Pulmonary abscess can be classified as simple, putrid and gangrenous. Under simple abscess are included amoebic abscess and pyogenic abscess occurring as a complication of a pneumococcus or streptococcus bronchopneumonia. A putrid abscess is characterized by its foul odor. This may arise secondarily from a simple abscess where the bronchial drainage is inadequate and putrefaction occurs. Putrid abscesses also arise following infection of the lung with spirochetes. Of great importance are the putrid infections which arise from infected material in the mouth, nose and throat. These are frequently seen following operation under general anaesthesia. During the operation, the cough reflex is lost and infected material may be aspirated into the terminal ramifications of the pulmonary tree. In 9 cases out of 10, such a putrid abscess is located in the right lower lobe. This may be accounted for by the larger size of the right main bronchus and its more direct continuation from the trachea when compared to the left main bronchus. This tendency to localize in the right lower lobe greatly favors the aspiration theory of origin over the concept that these abscesses arise from emboli through the blood stream. The embolic origin is possible but is probably quite unusual. Lung abscess of any type may be accompanied by complications. One of the most frequent is purulent pleurisy; this is to be differentiated from pyopneumothorax where a cortical abscess actually ruptures into the pleural space. Often this pleurisy appears as the only disease and the underlying abscess is not suspected. The not infrequent association of pulmonary suppuration with tuberculosis must also be recognized. An old tuberculous focus may be reactivated by direct spread of the abscess into the tuberculous area. The depression of general resistance resulting from the pulmonary suppuration may play a part in the flaring-up of an old tuberculous lesion. Bronchography is of great importance in all cases of pulmonary abscess as an aid in determining the size and position of the abscess and in determining the patency of the draining bronchus. About two-thirds of all simple pyogenic abscesses and one-fifth of all putrid abscesses go on to spontaneous cure. Many patients who appear to have been cured will suffer a relapse months or even years later. Medical treatment consists of drug therapy and mechanical treatment. The sulfonamide drugs appear to be useful but their true value as a curative agent in pulmonary abscess is yet to be appraised. Mechanical treatment consists of postural and bronchoscopic drainage. Both of these methods are of great value but their importance as curative measures is very definitely limited. Pneumothorax may help in some cases but it carried with it the danger of rupture of a cortical abscess into the pleural cavity. If the abscess is chronic and is surrounded by a great deal of fibrous tissue no compression will be obtained with pneumothorax. Surgical treatment should be considered in all cases where the abscess has not completely resolved in a maximum of three months. Delay makes subsequent surgery much more difficult and allows for greater possibility of complications. The author has seen very few favorable results with phrenicectomy and believes that it carries with it the same dangers in the therapy of lung abscess as pneumothorax. Extrapleural pneumothorax is beneficial in a small number of cases. Thoracoplasty with apicolysis is employed in certain cases where direct drainage is not feasible, particularly in cases of diffuse suppuration. Direct drainage by pneumonotomy will clear up many simple uncomplicated abscesses. Drainage is only feasible when the pleural layers are adherent so that there is no danger of contaminating the general pleural cavity. Where the process is extensive and chronic, with much fibrosis, ulceration and necrosis, lobectomy is to be considered. Good treatment of lung abscess requires extensive experience, coöperation between medical man and surgeon and individualization of the cases. —*Considérations générales sur le diagnostic et le traitement des abcès du poumon, Sergent, Progrès méd., May 11, 1940, 68: 402.*—(*H. R. N.*)

Bronchiectasis.—The calibre of normal bronchi increases at the end of inspiration and

diminishes at the end of expiration and coughing. In bronchiectasis the mucosal changes cause loss of the cough reflex. Stagnant secretions in the dilated bronchi cannot be coughed up until they overflow onto normal mucosa where the cough reflex can be initiated. The author set out to study the changes in the calibre of bronchi in the presence of bronchiectasis Lipiodol was instilled and the bronchi studied by taking X-ray films at the end of inspiration and expiration. One normal was studied, and the findings confirmed the widening at end of inspiration and the narrowing at the end of expiration. Four patients with established bronchiectasis, two "wet" or two "dry," were studied. In all these cases, the affected bronchi did not change in calibre during respiration; particularly notable was the lack of constriction on deep expiration. This lends evidence to the opinion that established bronchiectasis is irreversible and that surgery is indicated for cure. By this method of study, early cases of bronchiectasis, in which marked destruction of flexible elements of the bronchial wall has not yet occurred, might be recognized by the fact that the bronchi remain capable of changing in calibre at extremes of respiration. Such cases could be treated conservatively.—*Bronchial Calibre Changes in Bronchiectasis, J. Greenfield, J. Clin. Investigation, September, 1940,* ***19:*** *723.—(H. R. N.)*

Tracheobronchiectasis.—A case of ectasia of the trachea and of the left main bronchus and its branches is reported, together with a review of the literature. Clinically these cases are characterized by recurrent attacks of asthma, bronchitis and patchy bronchopneumonia. Because these exacerbations may easily occur during the period of military training and then lead to the diagnosis of the underlying condition, the compensability of the disease is discussed. The authors conclude that the disease is congenital and therefore not compensable beyond the point of caring for the acute exacerbation.—*Über Tracheo-Bronchiektasie, zugleich Bemerkungen zur Begutachtung der Bronchiektasien, M. Kartagener & K. Ulrich, Schweiz. med. Wchnschr., December 28, 1940,* ***70:*** *1266.—(H. M.)*

Cystic Bronchiectasis.—This is a well defined clinical, roentgenographic and pathological entity which appears to be distinct from other forms of cystic disease and the common bronchiectatic lesions resulting from various inflammatory lesions. Examples of the condition have been variously referred to in the literature as "polycystic lung", "*bronchiectasis universalis cystica*", and "open honeycombed lung". At postmortem examination, a large part of the lung is transformed into a cluster of thin-walled, cyst-like cavities of variable size which communicate freely with the bronchial branches and sometimes with each other. The large bronchi exhibit fusiform and varicose dilatations with regular even lumen; they often lead directly into the saccular dilatations. The pulmonary parenchyma is either absent or considerably reduced; the remaining alveoli show emphysematous changes. The cyst walls contain the structural components of the bronchial walls. In older individuals, there may be varying degrees of superimposed subacute and chronic inflammatory change. The disease is considered to be congenital in origin, and is probably the result of an impeded development of the bronchial tree occurring after the large and medium sized branches have been formed, preventing their further subdivision into smaller ramifications. This would explain the lack or considerable reduction of pulmonary parenchyma in the involved area. Another possible cause is the combination of an impeded development with a defective supporting stroma and insufficiently formed elastic elements. Seventeen cases were observed on the Tuberculosis Services of the Metropolitan and Sea View Hospitals and in the Tuberculosis Clinics of the Department of Health. Twelve were males; 5 were females. All ages were involved. One case was examined at necropsy. In most cases, symptoms were absent or only mild, but physical signs (râles, rhonchi, abnormal breath sounds) and roentgen changes were extensive. In 8 patients, there were histories of recurrent "chest colds", slight cough of many years' duration, either dry or slightly productive. Severe cough was present in 5 patients. Two patients had a history of a single haemoptysis. In none was the expectoration foetid in character. Cyanosis and

progressive dyspnoea on exertion were observed in older patients with emphysema or cardiovascular disease. Three patients had clubbing of the fingers. A number of patients dated the onset of their symptoms to early childhood. In the absence of complications, the general condition remains good. Roentgen examination revealed that in most cases the lesion occupied large areas, such as the greater portion of a lobe or even several lobes. The right lung was involved in 14 of the 17 cases; in all but 2 of the 14, the left lung was unaffected. The upper lobe was most frequently the site of disease. The lesion presents a honeycomb- or sponge-like appearance and often gives the impression of a bizarre network composed of meshes of various sizes. This appearance is produced by a cluster of thin-walled, closely packed cavities separated by fine trabeculations. Small fluid levels are often noted. If superimposed chronic inflammatory disease is present (usually in older patients), varying degrees of surrounding fibrosis and infiltration with resulting shrinkage of the lung are noted. Bronchography was performed in 9 cases. The contrast material readily filled the cavities, demonstrating them to be saccular dilatations communicating freely with the bronchial tree. Some of the cases also showed cylindrical and fusiform bronchiectasis leading directly into the dilated sacs. There were, however, no indications of distortion or irregularity in the shape or course of the dilatations as contrasted with ordinary bronchiectasis of inflammatory origin. Unless superimposed chronic infection is present, the "honeycomb" lung of cystic bronchiectasis is clearly distinguishable from ordinary chronic suppurative bronchiectasis on the basis of clinical and roentgenographic findings. The physical signs of upper lobe bronchiectasis often erroneously suggest tuberculosis. The differentiation from secondary bronchiectasis due to chronic fibroid tuberculosis is based chiefly on the absence of extensive fibrosis and lung contraction. The distinction between the cysts and tuberculous cavities rests on the typical sponge-like structure, the multilocular thin-walled appearance of the annular formations and the lack of infiltrative changes. Occasionaliy, however, tuberculosis may be a complication of cystic bronchiectasis. Emphysematous bullae rarely show well circumscribed complete ring shadows. The presence of multiple fluid levels speaks against emphysematous bullae. Not infrequently, however, diffuse emphysema with or without demonstrable bullae formation is associated with cystic bronchiectasis. Large solitary or multiple cysts are found mostly in infants and young children, whereas cystic bronchiectasis may be observed at any age. The former usually cause quite marked signs and symptoms of mediastinal pressure, often displacing the heart and mediastinal structures to the opposite side.—*Cystic Bronchiectasis, D. Reisner & J. G. Tchertkoff, Am. J. Roentgenol., March, 1940, 43: 327.*—(*W. H. M.*)

Bronchomoniliasis.—The literature on bronchomoniliasis is reviewed and an analysis is given of 23 cases studied and reported by 9 American authors. Fifteen of the cases were males, eight were females. The average age for males was 44 years, for females 27.4 years. Bronchomoniliasis is clinically indistinguishable from pulmonary tuberculosis. The onset was in order of frequency: (*1*) acute influenzal, (*2*) pleurisy, (*3*) haemoptysis, (*4*) acute bronchitis, (*5*) pneumonia, (*6*) asthma, (*7*) pertussis, (*8*) arthritic. The symptoms were: cough, expectoration, haemoptysis, loss of weight, fatigue, pain in the chest, spine, joints, dyspnoea, night sweats, fever, weakness. *Monilia albicans* was found in the sputum as the causative agent; in 10 cases it was pathogenic for laboratory animals. Massive doses of iodides, which were given to all patients, gave good results in 13 cases and 8 died. The author found pure cultures of monilia bronchoscopically in the bronchi of individuals suffering from bronchomoniliasis.—*Bronchomoniliasis. A Critical Review, R. S. Diaz Rivera, Bol. Asoc. méd. de Puerto Rico, March, 1941, 33: 107.*—(*G. C. L.*)

Actinomycosis.—Two cases of pulmonary actinomycosis are reported because such cases are infrequent, lack distinctive features, and are very similar, especially in their early stages, to other chronic pulmonary processes. The first was a woman of twenty-eight with a past history of repeated grippal infections and

contact with cases of serious but undiagnosed pulmonary infections. She gave a ten-month history of chest pain, fever, cough, haemoptysis and scant sputum. Finally multiple abscesses developed in the anterior chest, rupturing spontaneously and resulting in multiple fistulae. Death followed a period of diarrhoea. A chest X-ray film showed an "ulcero-fibrous process" on the right with marked pleural reaction and shift of the mediastinum to the left. The clinical diagnosis was pulmonary and intestinal tuberculosis. Autopsy revealed carnification and some cavitation of the right lung with marked thickening of the pleura and suppurative foci in the few nonadherent areas plus osteitis of four ribs where the process perforated to the outside. Microscopical examination revealed the parasite. Despite extensive dental caries no evidence of penetration of the parasite by way of the alveolar process was found. There was amyloidosis of the spleen and kidneys. The second case was a merchant of thirty-eight with a past history of chancre. The present illness consisted of dry cough, anorexia, and night sweats for five months and headache and pain in the left chest for two months with formation of multiple cold abscesses of the chest wall. A positive Wassermann and a positive tuberculin reaction were noted. Pupils reacted poorly to light. A chest X-ray film showed "pleuro-pulmonary process over entire left hemithorax" with shift of the mediastinum to the right. Planigraphy identified a subclavicular cavity. The discharge was repeatedly negative for tubercle bacilli. The aetiology of the process was not established clinically. Autopsy showed the left lung converted into a fibrous mass with numerous thick-walled cavities which, on section, gave forth yellowish granules; marked pleural thickening; apical pleurisy and small interstitial tubercles in the right lung; a tracheal node enlarged and containing small cavities filled with yellowish pus; and a firmly adherent pericardium. All these lesions were actinomycotic. In addition there were pyogenic foci (actinomycotic) in the spleen, kidneys and heart.—*Dos casos de actinomicosis pulmonar, E. Calderón Paul, Aparato respir. y tuberc., April–June, 1940, 5: 164.*—(*H. B. S.*)

Syphilis of Lung.—Acquired syphilis of the lung is rare but does occur. It leads to isolated gummatous or confluent lesions simulating chronic or acute tuberculosis, pneumonia or diffuse fibrosis. It localizes in the middle or lower parts of the lung as a rule, rarely in the apices, and as a late manifestation of the disease. The radiographic picture is not distinctive. Diagnosis is made by exclusion of other diseases, positive serological reaction, history and evidence of syphilis in other parts of the body.—*Neumopatia sifilitica, J. Martos Vallhonrat, Rev. de tuberc. (Havana), October, 1939, 3: 409.*—(*E. R. L.*)

Syphilis of Lung.—A report is made of the case of a white Cuban male of thirty-five, who complained of a cough of two months' duration, accompanied by scant yellow expectoration and loss of 5 pounds. Fever was present only during the first few days of illness. Ten years previously he had received inadequate treatment for a chancre. Six years after this he was treated for general paresis. Physical examination showed dulness and diminished breath sounds between the left scapula and the spine. The sputum was repeatedly negative for tubercle bacilli. The Mantoux reaction was negative at 1:100. The Meinicke reaction was three plus. The white blood count was 21,000 with 70 per cent polymorphonuclears. X-ray examination of the chest showed a more or less round, dense shadow in the mesial part of the left lung, merging with the hilum. There was a prompt improvement on treatment with bismuth, mercury and iodides. At the end of one month, cough was slight and no longer productive and the patient had gained weight. X-ray examination showed a decrease in the size of the shadow and a zone of decreased density in the centre of it. Three months after the start of treatment, an X-ray film showed complete healing and the Meinicke reaction was negative. The patient was symptom-free. The diagnosis is based on the past history, the positive serology, the absence of evidence of tuberculosis and the therapeutic test. There are 3 principal forms of pulmonary syphilis: sclerotic form, miliary gummata, large gummata. This case is of the last type.—*Un caso de sífilis pulmonar, J. Morera Carbonell,*

Arch. Soc. estud. clin. Habana, September–October, 1940, 4: 53.—(H. B S.)

Friedländer Lung Infections.—The importance of the Friedländer bacillus as a cause of chronic lung infections is receiving greater recognition. While acute Friedländer pneumonia usually terminates fatally and quickly, most survivors suffer from chronic Friedländer pneumonia for months or years, with a protracted and relatively benign clinical course. The author reports a study of 17 such cases of chronic pneumonia, never seen in childhood, most common in the fifth and sixth decades, and more common in males. The temperature in the chronic stage is irregular, febrile periods often alternating with periods of normal temperature. In this series, the disease lasted from one month to more than three years. The mortality was 23.5 per cent. Bacteraemia occurred in 31 per cent of these cases as compared with an incidence of 70 per cent in the acute Friedländer pneumonia. The upper lobes were involved in 82 per cent of the cases. Multiple lobe involvement was present in 30 per cent. The sputum is often mucoid and bloody in the early stages, later becoming mucopurulent if suppurative changes occur. A direct smear frequently reveals typical large encapsulated gram-negative bacilli. During the later stages, the organism is no longer present in pure culture but is found mixed with or overgrown by secondary invaders. Complications were chiefly limited to the chest and included lung abscess, bronchiectasis, pulmonary fibrosis, pleural effusion and empyema. Lung abscess occurred in almost 60 per cent of the cases and empyema in 23.5 per cent. Because of the frequency of blood streaking and the X-ray appearance of upper lobe cavities, the condition is commonly misdiagnosed as pulmonary tuberculosis. Four of the 17 cases were treated with sulfapyridine, and all recovered although pulmonary suppuration continued. One bacteraemic patient recovered under sulfanilamide therapy. The author feels that surgical drainage of chronic Friedländer lung abscess should be avoided, and that adequate drainage can be obtained by posture and repeated bronchoscopies. The results of sulfapyridine therapy, while only reported in 5 cases, are sufficiently encouraging to warrant further trial.—*Chronic Friedländer Infections of the Lungs, S. Solomon, J. A. M. A., November 2, 1940, 115: 1527.—(G. L. L.)*

Friedländer Pneumonia. — Pneumonia caused by the Friedländer bacillus presents a definite clinical picture. Most cases occur in the fifth and sixth decades of life and about six times more frequently in males; toxicity is great; the sputum is sticky and stringy and the disease has a very high mortality rate. A complete search of the literature from 1882 to 1937 has been made for reports of cases of pneumonia due to the Friedländer bacillus. In several large series totalling 11,248 cases of pneumonia, 86 (0.76 per cent) were due to the Friedländer bacillus. Up to 1915, 37 cases had been recorded and of these 3 had recovered. Since that time an additional 247 cases have been reported. Complete records are available in 233 cases and of these 219 died and 14 recovered, a mortality rate of 94 per cent. Only 5 cases have been reported in children. The present report is that of a seventy year old male who for twenty-five years had had bronchial asthma and chronic bronchitis. He then developed pneumonia and from the sputum a pure culture of Friedländer bacillus of Julianelle's Type A was recovered. This was verified on several occasions. The blood culture was negative. Treatment was carried out by means of iodides and sodium citrate as an expectorant and to counteract acidosis. In spite of his advanced age and the associated bronchial asthma and degenerative myocarditis, the patient recovered. Of the 14 cases reported in the literature in whom recovery took place, the average age was thirty-nine years. Therefore the relative youth of these patients is a significant factor in recovery since the average age of fatal cases is approximately fifty years. Theoretically serum treatment is the ideal treatment, but practically there are difficulties in its application since the serum is available in only a few eastern centres and since cases occur so infrequently that supplies of satisfactory serum cannot be kept on hand. The usefulness of iodides is determined by the fact that in Friedländer pneumonia there is significant bronchial and bronchiolar involvement. There-

fore these drugs are effective in aiding the patient to dispose of his tenacious bronchial secretions.—*Recovery from Acute Friedländer Pneumonia; Report of a Case and Review of Literature, M. M. Hartman, Ann. Int. Med., September, 1940, 14: 513.*—(*A. A. E.*)

Tularemia of Lung.—The pleuropulmonary lesions associated with tularemia are so characteristic that they must be accepted as a manifestation rather than a complication of the disease. There are probably 56 necropsy reports of tularemia on record; lesions of tularemic pneumonia were described in 35 cases, an incidence of 62.5 per cent in fatal cases. Haematogenous dissemination of the infection is most probably responsible for the great majority of the pulmonary lesions. Infection through inhalation has not been proved and is extremely rare, if it ever occurs. Pneumonia is relatively more frequent in patients with the so-called typhoid form of tularemia. In the thorax, as elsewhere, tularemia has been found to be primarily a necrotizing process, with foci of necrosis as the outstanding lesion. Two pathological processes go on together: (*a*) a necrotizing action of the aetiologic agent and (*b*) a cellular reaction of the reticulo-endothelial-monocytic-epithelioid type. Necrosis tends to predominate in the early lesions. Old necrotic lesions become encapsulated, first by monocytes and epithelioid cells, and later by fibrous tissue. Giant cells occur with appreciable frequency only in late lesions. The pleura has shown fibrinous, fibrinocellular and fibrinocaseous exudation in a number of cases. *B. tularense* has been recovered from the sputum and lung in some cases. The histological resemblance of the initial focal necrosis in tularemia to the early tubercles of tuberculosis has been pointed out, as has the similarity of tularemic caseous pneumonia to tuberculous pneumonia. The two conditions are likely to be confused clinically, particularly when accompanied by pleural effusion. Anatomically, peribronchial infiltration is a prominent feature of tularemic involvement of the lungs; this may cause bronchitis with subsequent peribronchial thickening visible on roentgen examination. The authors studied 95 cases of tularemia observed at the University of Virginia Hospital; 35 of these had been previously reported. Males outnumbered females approximately 2 to 1 and the ratio of whites to Negroes was likewise 2 to 1. All age groups were represented. The types of infection were grouped as follows: ulceroglandular, 63; typhoid, 21; glandular, 7 and oculoglandular, 4 cases. Most of the inoculations were accounted for by rabbits; a few apparently resulted from contact with ticks, squirrels, opossums, weasels and cats. The periods of incubation seemed to vary from a few hours to two weeks. Ulcers and enlarged lymph nodes were the chief complaints of the majority of patients. The patients were first seen from one day to several years after onset of symptoms. Many agglutination tests were first performed only because of unexplained fever or puzzling chest condition. The diagnosis was confirmed by a positive agglutination test in all but one instance, in which *B. tularense* was recovered postmortem. The mortality rate for the series was 10.5 per cent and 7 necropsies were done in the 10 fatal cases. Of the entire group of 95 cases, 40 had cough, 19 raised sputum, 19 had pain in the chest and 13 complained of dyspnoea. Signs indicative of pleurisy or pleural effusion were thought to be present in 16. In 89 of the patients, roentgenograms of the chest were made; some type of X-ray abnormality was recorded in more than 90 per cent of this group. A clinical diagnosis of tularemic pneumonia, on the basis of physical signs or X-ray examination, was made in 20 patients. Pleural fluid was removed from 13 patients of whom 5 also had pneumonia. A diagnosis of bronchitis on the basis of symptoms, signs and roentgen study was justified in 19 instances but the bronchitis was uncomplicated in only 10 of these. In one of the 10, clinical atelectasis developed. Therefore, a clinical diagnosis of pleuropulmonary disease was warranted in 38 patients. The incidence of pneumonia in this series was 21.5 per cent. In other series, the incidence has ranged from 12.7 to 18.2 per cent. The symptoms are not characteristic. The onset is less abrupt than that of pneumococcic pneumonia. Roentgen evidence of consolidation is found from a few days to two weeks after inoculation. The physical signs of pneumonia are nearly always found within three weeks of

the onset of tularemic infection; if they are not present by this time, it can be assumed that they will not occur later. Productive cough, chest pain and dyspnoea are common symptoms. In general, the pulse is slow and the leucocyte count low in proportion to the fever. Many of these patients with pneumonia had signs of bronchitis elsewhere in the lungs and one-fourth presented signs of pleural fluid. High fever persisted from two to four weeks but recovery of normal strength was usually a matter of many months. The mortality rate in routine cases of tularemic pneumonia is about 30 per cent. It is probable that death is caused by septicaemia and not by pneumonia *per se*. Five cases of pnuemonia in this series were autopsied and protocols are detailed. Of the 13 patients with hydrothorax, 69 per cent had the typhoid type of tularemia. Effusion occurs somewhat later after inoculation than pneumonia. In general, the symptoms were comparable with those found accompanying tuberculous effusions with the exception of a relatively slow pulse rate. Usually the leucocyte count was normal or only slightly elevated. The aspirated fluid had the properties of an exudate. Lymphocytes predominated over polymorphonuclear cells in the fluid. All the fluids agglutinated *B. tularense* and were negative for acid-fast bacilli. Three of the patients with fluid died but these also had pneumonia. Probably tularemic pleural effusion alone is rarely fatal. There were 2 cases of spontaneous pneumothorax in this series one of whom died. It is difficult to prove that the clinical bronchitis and peribronchial thickening noted in 19 cases resulted from tularemia. However, bronchitis has been observed at autopsy in persons with tularemia and it was seen so frequently in this series that it seems logical to attribute this condition to the tularemic infection. The prognosis is not serious when bronchitis alone is present. Chronic bronchitis of clinical significance occurred rarely in this series. There was one case of massive atelectasis which apparently resulted from excessive bronchial exudate and which was relieved by bronchoscopic drainage. Massive atelectasis during life in tularemia has not been recorded previously. The similarity of pleuropulmonary tularemia to tuberculosis must always be kept in mind, particularly in areas where tularemia is prevalent. Caseous pneumonia, pulmonary cavitation, nonpurulent pleural effusion, spontaneous pneumothorax and "round foci" all occur in tularemia and may be confused with pulmonary tuberculosis. Pleuropulmonary tularemia is sufficiently frequent to be considered in the differential diagnosis of all thoracic conditions of obscure causation.—*Pleuropulmonary Tularemia, S. D. Blackford & C. J. Casey, Arch. Int. Med., January, 1941, 67: 43.*—(*H. R. N.*)

Löffler's Syndrome.—This syndrome, described by Löffler in 1931, is characterized by four cardinal signs: signs of pulmonary disease on percussion and auscultation, the presence of a corresponding shadow on the X-ray film, transcience of the pulmonary signs and increase of the eosinophiles in the blood. One hundred and five cases have so far been reported. The authors report a patient of their own. The patient was a twenty-five year old female with a previous history of a long drawn out episode of bronchitis following which she had been subject to repeated attacks of catarrh and bronchial asthma. Several X-ray films of the lungs in recent years had revealed no abnormalities. Her present illness began with left chest pain, dry cough and fever of 100°F. There were decreased resonance, distant bronchial breathing and fine crepitant râles on the left side below the clavicle and in the corresponding area posteriorly, over an area as large as the palm of the hand. Over the middle of the left clavicle, there was a firm tender lymph node the size of a plum. A chest roentgenogram showed a triangular shadow lateral to the left hilum. The white blood count was 9,850 with an eosinophilia of 11 per cent. Within nine days, the pulmonary infiltration almost entirely disappeared, the lymph node was no longer palpable and within two weeks the patient was entirely well and able to return to work. During this period there was a persistent eosinophilia up to 22 per cent. The highest white blood count was 14,500. Toward the end of the illness, the patient expectorated some clear, tenacious sputum containing few cells, no eosinophiles and no helminth eggs. Examination of the stools on several

occasions showed no worms or eggs. Symptoms at all times were mild and treatment was purely symptomatic. The symptoms of this condition are usually mild and, undoubtedly, many cases do not come under medical observation. The syndrome appears to be a definite entity. The signs are often alarming and may sometimes lead to a more serious mistaken diagnosis, such as tuberculosis. In all cases hitherto observed the condition has ended in resolution. There are, consequently, no anatomical observations. The aetiology is not settled. All observers are agreed that allergic phenomena play a decisive rôle. The authors feel that a variety of factors may produce this condition. The chief importance of correctly diagnosing this condition lies in its differentiation from more serious illnesses.—*Transitory Infiltration of the Lung with Eosinophilia, R. Freund & S. Samuelson, Arch. Int. Med., December, 1940, 66: 1215.*—(*H. R. N.*)

Transient Pulmonary Opacities.—Certain symptomless or almost asymptomatic inflammatory processes occur in the lung that are characterized by rapid evolution and disappearance. They are of variable localization and extent. They result from different causes, including acute and subacute diseases like measles and typhoid fever, allergic conditions, such as asthma and urticaria, parasitic infections (ascaris and *fasciola hepatica*), infection with a number of common microbic agents, (pneumococcus and colon bacillus) and finally tuberculosis. The radiographic picture is suggestive of a lesion of rapid evolution, but not diagnostic. The tuberculin test is of value in reaching a diagnosis and examination of sputum and gastric washings is important. Blood counts are of minor value. The presence of eosinophilia, however, may lead to the diagnosis in cases of parasitosis and allergy. The prognosis is good except in those cases due to the tubercle bacillus. The pathological anatomy, because of the benign nature of the lesions, has not been studied at necropsy, but the lesion is believed to represent a lobular inflammatory process with little general reaction and with restitution *ad integrum.*—*Opacidades pulmonares labiles, J. E. Garcia Laredo, Rev. argent. de tuberc., January–March, 1940, 6: 1.*—(*E. R. L.*)

Bronchopneumonia of Unknown Aetiology.—During the last few years attention has been directed to a variety of pneumonia which differs in many particulars from the familiar form of lobar pneumonia caused by pneumococci, as well as from the less common forms of lobular or bronchopneumonia due to haemolytic streptococci, staphylococci, *B. tularense* and other well defined causes. Beginning with 1935 reports of atypical pneumonia have increasingly appeared, especially of epidemics occurring in schools and colleges. Since there is circumstantial evidence that this disease is contagious, and since at times the pneumonia may assume a serious character, it seems desirable to place on record descriptions of the clinical course of this infection, so that its position among the respiratory infections may, in this respect, be well defined. Thirty-two cases of this particular variety of pneumonia are reported on from the Johns Hopkins Hospital. For convenience sake the disease has been designated "Pneumonia, Variety X". The age of these patients ranged from seventeen to seventy, though the majority were between twenty and thirty. Twenty were men and 12 women. Over one-half of these patients were connected with the hospital,—doctors, orderlies, nurses etc. Although occurring at all seasons of the year more than half the cases (18) were encountered in October, November and December. The acute phase of the disease was usually preceded by a day or two of malaise with unproductive cough, increasing in intensity. Then followed fever, headache, general aches and discomfort, chilly sensations and occasional abdominal pain and nausea. An acute chill was unusual. The cough sometimes became paroxysmal. Pain in the chest was also infrequent. In 4 of the patients the onset of the disease was accompanied by a more or less severe pharyngitis. The fever was unusually high at the onset, but the pulse rate and the respiration were not, as a rule, proportionally elevated. At this time, too, there was rarely cyanosis, and the patients did not look or feel very ill. Although the cough was often severe it usually remained

nonproductive. The examination of the lungs during the first few days of illness usually showed no conspicuous abnormality, though in some patients there was a slight dulness over one or the other lower lobes sometimes accompanied by suppressed breath sounds and a few fine râles. In 4 instances the spleen was readily palpable during the course of the disease. A moderate leucopenia commonly characterized the early stages of the disease. In only 2 cases was the leucocyte count above 11,500, one of these being complicated by a urinary tract infection. The differential leucocyte count during the period of leucopenia showed little, if any, variation from normal. In 13 patients, however, there was a shift to the left (neutrophiles) and in 10 neutrophilic myelocytes were seen. In more than half the cases eosinophilic leucocytes were present. The subsequent course of the disease varied greatly from a mild infection to one which was extremely grave or fatal. There were 12 mild cases, 11 moderately severe and 9 severely ill. The patients in the mild group rarely felt ill for more than two or three days, the most distressing symptom being the harassing nonproductive cough. Some had sweats. As the disease proceeded most patients showed some dulness, often suppression of breath sounds and always some râles over some area of the chest. In 3 patients, however, the signs were limited to a few râles heard over the left lower lobe. In all, X-ray films disclosed shadows often extending from the roots of the lung towards the periphery or involving the peripheral portion of one lung in the mid or upper field. The extent of these shadows was all out of proportion to what might be expected from the meagre physical signs. The left lung was the more common site of the disease. Blood cultures, made in 7 of the 12 patients, gave no bacterial growth. The temperature usually fell to normal by the fifth to the tenth day. In several instances, however, there was a preliminary rapid drop in temperature followed by a secondary rise with an irregular defervescence. During the late stages of the infection there was usually a moderate rise in the leucocyte count. With improvement increasing coarse râles were heard in some patients. Râles and X-ray shadows rarely disappeared before the tenth day of the disease, but in some persisted much longer. Convalescence was rapid and uncomplicated and recovery complete in this group. In the moderately severe group the disease manifested its greater severity by an intensification and prolongation of the acute symptoms, by the frequency of a secondary rise of temperature and a longer period of fever, by the occasional appearance of cyanosis, and by more severe and extensive chest findings. Frank tubular breathing was comparatively rare. Acute symptoms with fever lasted from seven to twenty-one days. Physical signs or X-ray shadows persisted for over four weeks in the majority of this group. One patient developed an otitis media; the remaining 10 patients recovered without complications. In the last group of 9 cases, although the symptoms at onset were similar to those previously described, the subsequent course assumed the character of an intense infection. Prostration was severe with headache, sweating and persistent cough. In some patients, as the disease progressed, cyanosis became prominent, often not entirely relieved by oxygen. In all patients in this group there was a transient fall in temperature during the first week of the disease, with a subsequent rise followed by a prolonged febrile period. During the course of the illness the pneumonia process tended to spread from one lobe to another. Some signs of solidificiaton were common in this group, for dulness and small areas of tubular breathing occurred in all cases. The duration of the acute febrile illness varied from thirteen to twenty-five days. The residual physical signs and the diminishing X-ray shadows, however, persisted for a much longer time, lasting for at least one to two months. In one patient the disease was complicated by multiple thromboses. Seven patients recovered without residual abnormalities in the lung; 2 died. Twelve of the 32 cases had been in direct and often intimate contact, previous to the onset of their illness, with patients suffering with the same variety of bronchopneumonia. From the case records it is obvious that the incubation period is long, extending in most cases over a period of about fourteen to twenty-one days. This study throws no light upon the aetiology of the infection. Blood cultures and other blood

examinations were all negative. Tubercle bacilli were never found. A few nonpathogenic pneumococci occurred in some sputa. During the later stages of the disease haemolytic staphylococci were found in 2 patients. The disease possesses many features which suggest that it might be caused by a filterable virus although no serious attempts were made to isolate a virus from the sputum or nasopharynx of these patients. The peculiarity of the pathological changes in the lung wherein the exudate in the alveoli was found to consist largely of mononuclear cells is also suggestive of virus disease. The use of sulfano derivatives had no effect on the course of the disease. The clinical features of this affection appear sufficiently distinctive to allow one, even without knowledge of its aetiology, to recognize the infection as a disease entity. Illustrative case histories, reproductions of characteristic X-ray films, temperature charts etc. accompany the article. —*Bronchopneumonia of Unknown Etiology (Variety X), A Report of Thirty-two Cases with Two Deaths, W. T. Longcope, Bull. Johns Hopkins Hosp., October, 1940, 67: 268.*—(*J. S. W.*)

Atypical Bronchopneumonia.—For the past four years a mild form of pneumonia, believed to be a separate disease entity, has been observed among the students at Harvard University. The disease began as a simple infection with minimal respiratory symptoms and signs. X-ray examination, early in the disease, revealed a pulmonary lesion beginning at the hilum and advancing toward the lateral chest wall or diaphragm. Temperature returned to normal in five to seven days. Complications were few and mild. The disease is contagious and has an incubation period of seven to eleven days. Attempts to isolate a virus or offending organism were unsuccessful.—*Atypical Bronchopneumonia of Unknown Aetiology, M. E. Murray, New England J. Med., April 4, 1940, 222: 565.*—(*S. T.*)

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